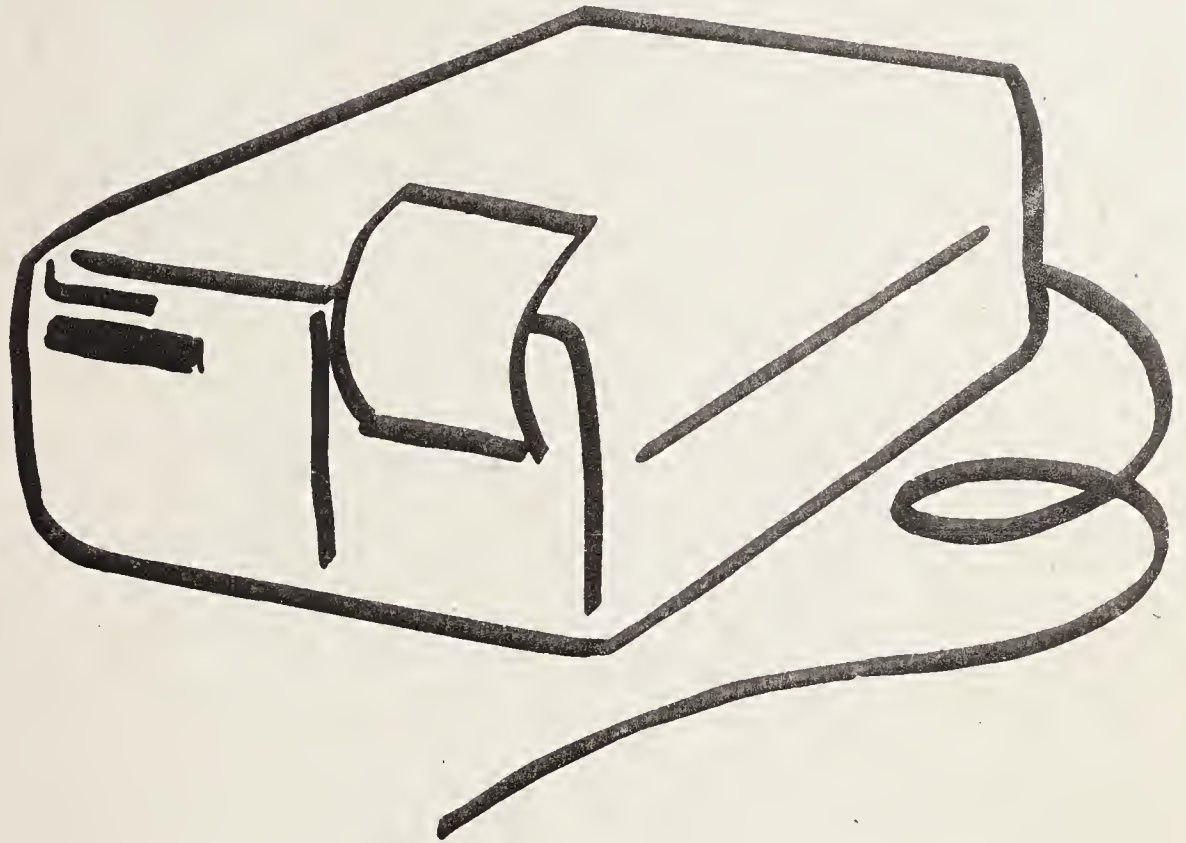


# PowerScope Users Manual



**Warning:** This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against each interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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# What to do first

## 1. Check the contents of your shipping container against this list:

- PowerScope
- Carry Bag
- Input Cable Set including:
  - Three-connector measuring cable
  - 4 red cables with easy hooks or alligator clips
  - 4 black cables with easy hooks or alligator clips
  - 4 green cables with easy hooks or alligator clips
  - 3 blue or yellow jumper cables
  - 1 Neutral-to-Ground cable (yellow-to-green)
- 3 rolls thermal paper (1 roll is installed in the PowerScope)
- Warranty Card
- "So you're not going to read the manual" Card
- PowerScope User's Manual

If you don't have all these items, call BMI customer service.

2. **Check your PowerScope for physical damage.** If there is a problem, call us.
3. **Read the next section of this manual to get a feel for how the PowerScope can solve your power monitoring problems.**





## Take it for a spin

This section is a short demonstration of how the PowerScope works. (We might have called this section "Impatient User's Guide" because if you go through this demonstration you'll get to run the PowerScope immediately.)

**NOTE:** Follow the directions exactly to prevent damage to your PowerScope!

1. **Before turning your PowerScope on, check to see that it is set for the correct supply voltage.** On the back panel of the instrument there is a small PC card under the fuse-holder for the input power. It will show either "120 VAC" or "240 VAC". Make sure that it shows your nominal supply voltage; if it doesn't, gently pull it out with a pair of needle-nose pliers, and turn it over.
2. **Find the power cord in the shipping container and plug your PowerScope into an ordinary wall outlet.** (Don't worry about connecting it up for real monitoring yet.)

As soon as you plug it in, the PowerScope will give you a short printout :

Instrument power applied at:  
[time and date]

and the display will show "Idle." or "Monitor".

3. **Press the RECALL MEMORY key.** (We're going to show you a way of letting the PowerScope do all the work for you--it selects its own threshold settings automatically!)

You'll notice that as soon as you press the RECALL MEMORY key (1) the display lights with Recall memory ... , (2) the light next to the RECALL MEMORY key lights, and (3) the lights beside the VALUE UP/VALUE DOWN keys flash.

4. **Scroll through the choices you have for the "Recall Memory" question by pressing the VALUE UP/VALUE DOWN keys.** Stop when you get to the choice: DEFAULT.

5. **Press the down arrow.** The display will light with the message: DEFAULT recalled. All the PowerScope's threshold settings for single-phase power have been set automatically. (The PowerScope stores three setups in memory so you can recall setups quickly, for 3-phase wye for example, and save field time. See Chapter 4 on how to use this feature.)

6. **Press the MONITOR key.** The display will light with "Monitor thresholds" and the printer will start printing a threshold report showing all the PowerScope's current settings. It will also print initial waveshape graphs, but in this case, since you aren't really set up for monitoring, the graphs will just show straight lines.

**NOTE:** If you **had** actually connected the PowerScope for monitoring single-phase power, you'd really be monitoring. That's all there is to it!

## Want to press some more keys?

1. **Press the key labeled SET UP MENU.** (The Setup Menu contains all the questions on how the PowerScope should be set for reporting disturbances.) Use the down arrow and up arrow to scroll your way through the questions in the Setup Menu. You'll notice that sometimes the VALUE UP/VALUE DOWN keys will flash as you do this. Pressing these keys scrolls you through the choices for each question. If you ever need assistance, remember to press the HELP key. It can save you time because it provides printed information on whatever question you're looking at. When you're done looking at a question, press the down arrow to go to the next one.



**2. Press the key labeled REPORT MENU.** (The Report Menu contains all the questions on how the PowerScope should be set for reporting summary strip chart reports.) The Report Menu works the same way as the Setup Menu--press the down and up arrows to scroll through the questions, and press the VALUE UP/VALUE DOWN keys to scroll through the possible choices for each question.

**3. Press the SETUP MENU key, then quickly press the up arrow.** That's how you access the Key Operator Menu. The Key Operator Menu contains questions that are seldom changed. Scroll through them to see what we mean.

**4. You could go on to press some more keys if you want.** Some interesting ones are SELF TEST and SELF CALIBRATE.

**NOTE:** If you press the LOCK key, the keyboard will lock. To unlock, press LOCK, then CLEAR.

If you're anxious to get started, we recommend that you read the next section, "General Sequence of Operation", then refer to Chapter 6 on connecting the PowerScope for different types of monitoring. If you have any kind of problem, (or really just can't stand reading manuals to get this kind of information), call us at BMI and ask to talk to a Customer Service Representative. We'll be glad to help you.



# General Sequence of Operation

The usual sequence for operating the PowerScope monitor is:

**1) Press the SETUP MENU key and answer the questions.** (If you don't know what a good choice would be, press the DEFAULT key.) To go on to the next question, press the down arrow.

**NOTE:** Anywhere along the way, if you need help, you can press the HELP! key and receive an explanation of what to do next.

**2) Connect the monitor to the power line.** (When you get to the question called "TYPE:" in the Setup Menu, press the HELP! key for a quick explanation on how to connect the PowerScope for different power types, or see Chapter 6 in this manual.)

**3) Press the MONITOR key to monitor the power line.** Disturbance graphs and reports will be printed automatically.

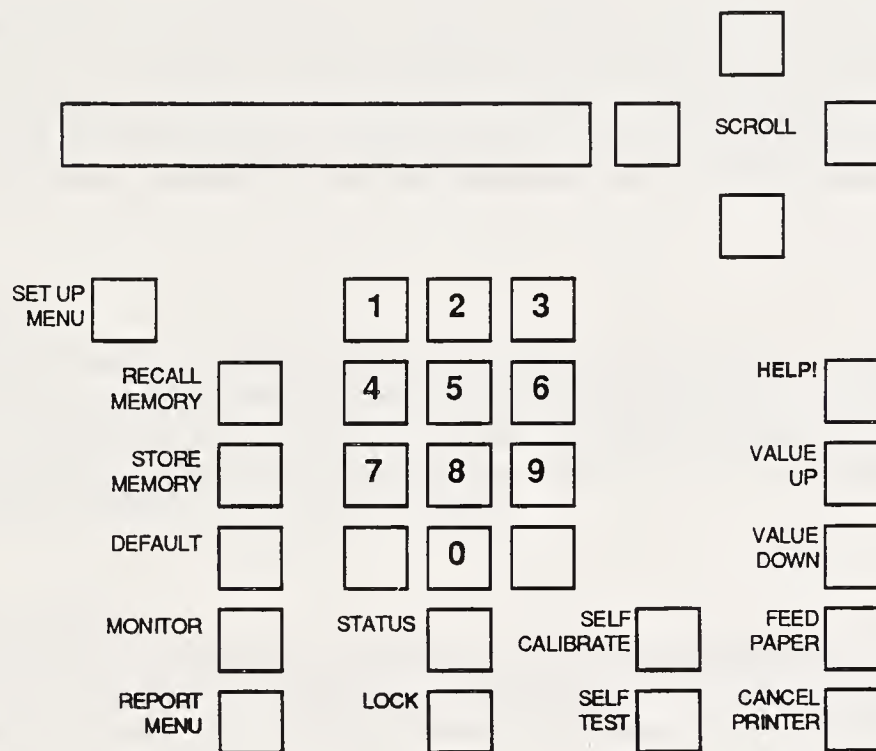




# Understanding the Keyboard and Menus

## The Keyboard

Here's a quick description of the function of every key on the PowerScope's keyboard:



SETUP MENU - accesses set-up menu

RECALL MEMORY - accesses stored group(s) of settings

STORE MEMORY - stores settings in memory

DEFAULT - sets logical settings for some of the thresholds

HELP! - provides printout explaining current status of instrument and provides information on how to proceed.

VALUE UP/VALUE DOWN - scrolls up and down through possible choices for one parameter

MONITOR - initiates print out of current threshold settings and starts instrument operation.

REPORT MENU - accesses Report Menu

STATUS - samples power line and provides printed status report including present voltage, high frequency noise, and internal battery condition.

LOCK - locks keyboard.

SELF CALIBRATE - Causes calibration module to examine instrument reading compared to very accurate internal secondary reference voltage source and prints report.

SELF TEST - provides printout of current software version installed, initiates instrument self-diagnosis, and prints report.

FEED PAPER - causes paper wheel to advance.

CANCEL PRINTER - cancels printer action instantaneously.

SCROLL arrows - moves cursor in display, scrolls through questions in menus.

Numerical/Letter keypad - used for making control settings.

CLEAR - unlocks keypad





## The Menus

There are three different menus of questions:

- (1) the Set-up menu,
- (2) the Report menu, and
- (3) the Key Operator menu.

### The Setup Menu

The Set-up menu controls the thresholds of the PowerScope. This is the menu you'll use just before monitoring. You can enter the Set-up menu by pressing the **Set-up menu** key. The PowerScope varies the Setup Menu according to what type of power you are monitoring, how many channels your PowerScope has, and if you are using any environmental probes. For a list of all the possible questions contained in the Setup Menu(s) with their default settings, see Appendix B.

### The Report Menu

You'll use the Report menu to control the level of detail the PowerScope reports. You can look at the Report menu by pressing the **Report menu** key. (You don't need to use the Report menu if you don't want to; your PowerScope will select reasonable answers for you.) The Report menu changes depending on how the Setup Menu is setup. For a list of all the possible questions contained in the Report Menus(s), see Appendix C.

### The Key Operator Menu

The Key Operator menu controls the internal settings of the PowerScope, including the clock and the calendar. If you need to use the Key Operator menu, press the **Set-up menu** key, then immediately press the **up arrow** key. The questions in this menu are listed in Appendix D.



## How to use this manual

The information in this manual is presented in the order you are likely to need it if using the PowerScope for the very first time.

The first three chapters describe the menus and explain their questions. "Defining Power Disturbances: Using the Setup Menu" and "Presenting and Summarizing Output: Using the Report Menu" (Chapters 1 and 2) are divided into sections for the different power types you may be monitoring.

Chapter 4 tells you how to save setups in memory, and Chapter 5 shows you how to protect the PowerScope against tampering.

Chapter 6 explains how to connect the Power Scope to power lines for monitoring, and Chapters 7 and 8 discuss what to do to monitor power and the environment.

Chapter 9 includes some simple troubleshooting procedures and information on the calibration of your PowerScope.

Chapter 10 answers some common questions about the PowerScope, including how to load paper.

The Appendices provide some useful hints on operation, connection for monitoring, and the menus.

You don't need to read this manual from cover to cover. The information presented here is for reference. The PowerScope is very easy to use and to learn to use. The green HELP! key on the front panel provides you with just about all you need to know to monitor power and the environment safely and accurately!

## Typographical conventions

The following table explains the significance of certain typefaces and symbols used in this manual.

### EXAMPLE

**Use the value up/value down keys**

Single phase  
**Type: Dual 1-phase**  
3-phase delta  
3-phase wye  
Ind. channels

1 Hz



450 Hz

### MEANING

Boldface indicates a directive or instruction. Light-faced type appearing after instructions give an expanded explanation of the instruction.

The PowerScope's display shows Dual 1-phase and other possible choice "behind" the window display.

Indicates there is a range of choices between the two values.



# Chapter 1 Defining Power Disturbances: Using the Setup Menu

## Setting up for single-phase power

This section shows you how to set up the PowerScope if you want to monitor single-phase power. (See Chapter 6 for how to connect the PowerScope for monitoring.)

The procedure for using the Setup Menu is:

- 1) Press the SETUP key.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access these choices.
- 3) Press the down arrow key to go on to the next question.
- 4) Press the HELP! key if you want further explanation about the question.

The first question in the Setup Menu is:

Question #1: **Summary rpts:**      **Print**  
   **Clear**

**Note:** (You'll only get this question if the PowerScope has been monitoring and collected enough data points (about 15 minutes of monitoring) to want to print that data.)

**Use the value up/value down keys to choose whether you want the summary reports and strip charts printed now.** If you choose "Print", the summary reports will be printed immediately when you press the down arrow, then cleared. If you choose "Clear", the data in the summary reports will be discarded, and nothing will be printed. Always press the down arrow key if you want to go on to the next question, or the up arrow key if you want to go back to the previous question.

Question #2: **Site: BMI 4800 SITE**

**Use the number keys to enter the name of the site where you will be monitoring the power.** The name can be up to 20 characters long. Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear, on the second a J, and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the O SPACE button twice to enter a space. Press the down arrow key to go on to the next question,.

Question #3: **Type:      Single Phase**  
                                 Dual 1-phase  
                                 3 phase delta  
                                 3 phase wye  
                                 Ind. channels

**Use the value up/value down keys to select single phase power.**



Question #4: **Nom. freq.:** .1 Hz  
↕  
450 Hz

Use the number keys to enter in the nominal frequency of the line you are monitoring. A typical setting is 60.0 Hz.

Question #5: **Freq. tol.:** 0.6  
↕  
15.0 Hz

Use the number keys to enter, in Hertz, the amount of line frequency deviation from nominal you are willing to tolerate before the PowerScope reports a disturbance. The range is 1% to 30% of the nominal frequency setting. A typical value is 2% of your nominal frequency.

For example, if your nominal frequency setting is:

40.0 Hz, the frequency tolerance range is .4 Hz (1%) to 12 Hz (30%).

If your frequency is 50.0 Hz, the frequency tolerance range is .5 Hz to 15 Hz.

If your frequency is 60.0 Hz, the frequency tolerance range is .6 Hz to 18 Hz.

Question #6: **Surge Volt:** 1.0Vrms  
↕  
600Vrms

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. (In this case 10% of 60 Hz is .6 Vrms.) The acceptable range is 1.0 Vrms to 600.0 Vrms.

Question #7: **Sag volt:** 0.0 Vrms  
↕  
599.0 Vrms

Use the number keys to enter the low voltage threshold. The usual value is about 15% below the nominal voltage. The acceptable range is 0.0 to 599.0 Vrms.

Question #8: **Impulse thr:** 20 Vpk  
↕  
6000 Vpk

Use the number keys to enter the value of the smallest impulse you wish the PowerScope to report. Typical thresholds are in the range of 100-250 volts. You may select any value from 20 Vpk to 6000 Vpk.

NOTE: You'll only get the next question if you have Impulse Ranging in the Key Operator Menu set to MANUAL.




Question #9:    **Imp. range:**            400 Vpk  
   800 Vpk  
   1600 Vpk  
   3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.


**NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you will not see this question. If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the settings you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #10:    **Neut-Gnd:**            0.1 Vrms  
     
   99.9 Vrms

Use the number keys to enter the acceptable AC voltage difference between the neutral and ground lines you are monitoring. You may select any value from 0.1 Vrms to 99.9 Vrms. (Typical thresholds range between 1.0 and 10.0 Vrms.)

**NOTE:** If you have selected MANUAL impulse ranging in the Key Operator Menu, you will not get the previous question.

Question #11:    **N-G imp thr:** 20 Vpk  
     
   6000 Vpk

Use the number keys to enter the value of the smallest neutral-to-ground impulse you want the PowerScope to graph. Typical thresholds range between 50-250 volts. You may select any value from 20 volts to 6000 volts.

**NOTE:** You'll only get the next question if you have Impulse Ranging in the Key Operator Menu set to MANUAL.

Question #12:    **N-G imp range:** 400 Vpk  
   800 Vpk  
   1600 Vpk  
   3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.

will **NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you not see this question.

If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold  
selected in previous  
question is between . . .

And Auto Impulse  
range in the Key  
Operator Menu is  
turned on . . .

The Impulse Range  
will set automatically  
to . . .

20 - 50 volts  
51 - 100 volts  
101 - 200 volts  
201 - 400 volts  
401 - 800 volts  
801 - 1600 volts  
1601....

+/- 100 volts  
+/- 200 volts  
+/- 400 volts  
+/- 800 volts  
+/- 1600 volts  
+/- 3200 volts  
+/- 6400 volts

Question #13: **Hi. freq. noise:** 1.0 V



19.9 V

Use the number keys to enter the high frequency noise disturbance threshold (measured in peak-to-peak volts). A typical threshold is 5.0 Vpk. The acceptable range is 1.0 Vpk to 19.9 Vpk.

**NOTE:** If you are using probes for environmental monitoring there will be additional questions. See Chapter 8 for an explanation of environmental thresholds.

**End of Setup Menu for Single Phase Power**

## Setting up for Dual Single-Phase Power

This section shows you how to set up the PowerScope if you want to monitor dual single-phase power. (See Chapter 6 for how to connect the PowerScope for monitoring).

The procedure for using the Set-up Menu is:

- 1) Press the SET-UP MENU key.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access the choices.
- 3) Press the down arrow by to go on to the next question.
- 4) Press the HELP! key if you want further explanation about the question.

The first question in the menu will be:

Question #1:   **Summary rpts:**    **Print**  
  **Clear**

**NOTE:** You'll only get this question if the PowerScope has been monitoring and collected enough data points (about 15 minutes of monitoring) to want to dump that data.

**Use the value up/value down keys to choose whether you want the summary reports and strip charts printed now.** If you choose "Print", the summary reports will be printed immediately, then cleared. If you choose "Clear", the data in the summary reports will be discarded, and nothing will be printed.

Question #2:   **Site:** B**MI 4800 SITE**

**Use the number keys to enter the name of the site where you will be monitoring the power.** The name can be up to 20 characters long. Use the **left arrow** and **right arrow** keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the **5JKL** key 3 times. On the first press, a 5 will appear; on the second, a J will appear; and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the **right arrow** key. Press the **0 SPACE** button twice to enter a space. Press the **down arrow** key to go on to the next question.

                                  Single-Phase  
Question #3:   **Type:**   **Dual 1-phase**  
                                  3-phase delta  
                                  3-phase wye  
                                  Ind. channels


**Use the value up/value down keys to select Dual 1-phase power.**

Question #4:   **Phase setup:**   **A**  
  **B**

**Use the value up/value down keys to choose which line you will set thresholds for now, A or B.** The thresholds for each line are completely independent of the other.



For the sake of example, let's say you choose A now. The next few questions about threshold settings will all pertain to line A. When you've set up all those thresholds, the PowerScope will ask you this same question again. At that time you would ordinarily answer B and proceed to set up all the thresholds for line B, although answering "A" to this second question would put you back to the beginning of the "A" questions. (Consider it just a fast way of getting back up to the line A settings).

Question #5: **Nom. freq:** 45.0 Hz  
  
450.0 Hz

Use the number keys to enter the nominal line frequency of the power you are monitoring. This provides a reference to the PowerScope on which it bases its measurements. Typical values are 50.0 Hz, and 400.0 Hz. The acceptance range is 45.0 Hz to 450.0 Hz.

Question #6: **Freq. tol:** 0.1 Hz  
  
40.0 Hz


Use the number keys to enter, in Hertz, the amount of line frequency deviation from nominal you are willing to tolerate before the PowerScope reports a disturbance. The range is 1% to 30% of your nominal frequency setting. A typical value is 2% of your nominal frequency.

For example, if your nominal frequency setting is:


40.0 Hz, the frequency tolerance range is .4 Hz (1%) to 12 Hz (30%).

If your frequency is 50.0 Hz, the frequency tolerance range is .5 Hz to 15 Hz.


If your frequency is 60.0 Hz, the frequency tolerance range is .6 Hz to 18 Hz.

Question #7: **Surge volt:** 1.0 Vrms  
  
600.0 Vrms

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. The acceptable range is 1.0 Vrms to 600.0 Vrms.

Question #8: **Sag volt:** 1.0 Vrms  
  
600.0 Vrms

Use the number keys to enter the low voltage threshold. The usual value is about 15% below the nominal voltage. The acceptable range is 1.0 Vrms to 600.0 Vrms.

Question #9: **Impulse thr:** 20 Vpk  
  
6000 Vpk

Use the number keys to enter the value of the smallest impulse you wish the PowerScope to report. Typical thresholds are in the range of 100-250 volts peak. You may select any value from 20 to 6000 volts.

**NOTE:** You'll only get the next question if Impulse Ranging in the Key Operator Menu is set to MANUAL.


Question #10: **Imp. range:** 400 Vpk  
800 Vpk  
1600 Vpk  
3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.

**NOTE:** If you selected Auto Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select Auto Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #11: **Neut-Gnd:** 0.1 Vrm  
  
99.9 Vrms

Use the number keys to enter the acceptable AC voltage difference between the neutral and ground lines you are monitoring. You may select any value from 0.1 Vrms to 99.9 Vrms. (Typical thresholds range between 1.0 and 10.0 Vrms.)

Question #12: **N-G imp thr:** 20 Vpk



6000 Vpk

Use the number keys to enter the value of the smallest neutral-to-ground impulse you want the PowerScope to graph. Typical thresholds range between 50-250 volts. You may select any value from 20 volts to 6000 volts.

**NOTE:** You will not see this question if you selected MANUAL Impulse Ranging in the Key Operator Menu.

Question #13: **N-G imp rng:** 200 Vpk  
400 Vpk  
800 Vpk  
1600 Vpk

Use the value up/value down keys to select the full-scale impulse range.

**NOTE:** If you selected Auto Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select Auto Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

A

Question #14: **Phase setup:** B

Use the value up/value down keys to choose which line, A or B, you will be setting thresholds for now. Assuming that you selected "A" at the start of this menu, you would now proceed to set thresholds for line "B" of dual one-phase power. If you choose A here, the PowerScope will revert back up to the beginning of the first set of questions.

The second half of the menu (for line B) is exactly the same as the first half except for this last question:

Question #15: **Hi. freq. noise:** 1.0 Vpk



19.9 Vpk

Use the number keys to enter the high frequency noise disturbance threshold (measured in peak-to-peak volts). A typical threshold is 5.0 Vpk. the acceptable range is 1.0 Vpk to 19.9 Vpk.

**NOTE:** If you are using probes for environmental monitoring there will be additional questions. See Chapter 8 for an explanation of environmental thresholds.

**End of Setup Menu of Dual One-Phase Power**



## Setting Up for Three-Phase Delta Power:

This section shows you how to set up the PowerScope if you want to monitor three-phase delta power. (See Chapter 6 for how to connect the PowerScope for monitoring):

The procedure for using the setup menu is:

- 1) Press the SETUP MENU key.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down key to access these choices.
- 3) Press the down arrow key to go onto the next question.
- 4) Press the HELP! key if you want further explanation about the question.

The first question in the menu will be:

Question #1:      **Summary rpt:**      **Print**  
   **Clear**

**NOTE:** (You'll only get this question if the PowerScope has been monitoring and collected enough data points (about 15 minutes of monitoring) to want to print that data.).


Use the value up/value down keys to choose whether you want the summary reports and strip charts printed now. If you choose "Print", the summary reports will be printed immediately, then cleared. If you choose "Clear", the data in the summary reports will be discarded, and nothing will be printed.

Question #2:      **Site: BMI 4800 SITE**

Use the number keys to enter the name of the site where you will be monitoring the power. The name can be up to 20 characters long. Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear; on the second, a J will appear, and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the 0 SPACE button twice to enter a space. Press the down arrow key to go on to the next question.

Question #3:      **Type:**      **Single phase**  
   **Dual 1-phase**  
   **3-phase delta**  
   **3-phase wye**  
   **Ind. channels**

Use the value up/value down keys to select 3-phase delta power.

Question #4: **Nom. freq.:**      **.1 Hz**  
     
   **450 Hz**

Use the number keys to enter in the nominal frequency of the line you are monitoring. A typical setting is 60.0 Hz.

Question #5: **Freq. tol.:** 0.6 Hz  
↕  
15.0 Hz

Use the number keys to enter, in Hertz, the amount of line frequency deviation from nominal you are willing to tolerate before the PowerScope reports a disturbance. The range is 1% to 30% of the nominal frequency setting. A typical value is 2% of your nominal frequency.

For example, if your nominal frequency setting is:

40.0 Hz, the frequency tolerance range is .4 Hz (1%) to 12 Hz (30%).

If your frequency is 50.0 Hz, the frequency tolerance range is .5 Hz to 15 Hz.

If your frequency is 60.0 Hz, the frequency tolerance range is .6 Hz to 18 Hz.

Question #6: **Surge volt:** 1.0 Vrms  
↕  
600.0 Vrms

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. (In this case 10% of 60 Hz is .6 Vrms.) The acceptable range is 1.0 Vrms to 600.0 Vrms.

Question #7: **Sag volt:** 0.0 Vrms  
↕  
599.0 Vrms

Use the number keys to enter the low voltage threshold. The usual value is about 15% below the nominal voltage. The acceptable range is 0.0 to 599.0 Vrms.

Question #8: **Impulse thr:** 20 Vpk  
↕  
6000 Vpk

Use the number keys to enter the value of the smallest impulse you wish the PowerScope to report. Typical thresholds are in the range of 100-250 volts. You may select any value from 20 Vpk to 6000 Vpk.

**NOTE:** You won't see the next question if you have selected AUTO Impulse Ranging in the Key Operator Menu.


Question #9: **Imp. Range:** 400 Vpk  
800 Vpk  
1600 Vpk  
3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.

**NOTE:** If you plan to select Auto Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #10: **Hi. freq. noise: 1.0 Vpk**

  
 19.9 Vpk

**Use the number keys to enter the high frequency noise disturbance threshold (measured in peak-to-peak volts).** A typical threshold is 5.0 Vpk. The acceptable range is 1.0 Vpk to 19.9 Vpk.

**NOTE:** If you are using probes for environmental monitoring there will be additional question. See Chapter 8 for an explanation of environmental thresholds.

**End of Set-up Menu for Three-Phase Delta Power**



## Setting up for three -phase wye power

This section shows you how to set up the PowerScope if you want to monitor three-phase wye power.

The procedure for using the Setup Menu is:

- 1) Press the SETUP key.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access these choices.
- 3) Press the down arrow key to go on to the next question.
- 4) Press the HELP! key if you want further explanation about the question.

The first question in the menu will be:

Question #1: **Summary rpt: Print**  
**Clear**

**Note:** (You'll only get this question if the PowerScope has been monitoring and collected enough data points (about 15 minutes of monitoring) to want to print that data.)

**Use the value up/value down keys to choose whether you want the summary reports and strip charts printed now.** If you choose "Print", the summary reports will be printed immediately, then cleared. If you choose "Clear", the data in the summary reports will be discarded, and nothing will be printed. Always press the down arrow key if you want to go on to the next question, or the up arrow key if you want to go back to the previous question.


Question #2: **Site: BMI 4800 SITE**

**Use the number keys to enter the name of the site where you will be monitoring the power.** The name can be up to 20 characters long. Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear, on the second a J, and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the O SPACE button twice to enter a space. Press the down arrow key to go on to the next question,.

Single Phase  
Dual 1-phase  
3 phase delta

Question #3: **Type: 3 phase wye**  
**Ind. channels**

**Use the value up/value down keys to select single phase power.**

Question #4: **Nom. freq.: .1 Hz**  
  
**450 Hz**

**Use the number keys to enter in the nominal frequency of the line you are monitoring.** A typical setting is 60.0 Hz.

Question #5: **Freq. tol.:** 0.6 Hz  
↕  
15.0 Hz

Use the number keys to enter, in Hertz, the amount of line frequency deviation from nominal you are willing to tolerate before the PowerScope reports a disturbance. The range is 1% to 30% of the nominal frequency setting. A typical value is 2% of your nominal frequency.

For example, if your nominal frequency setting is:

40.0 Hz, the frequency tolerance range is .4 Hz (1%) to 12 Hz (30%).

If your frequency is 50.0 Hz, the frequency tolerance range is .5 Hz to 15 Hz.

If your frequency is 60.0 Hz, the frequency tolerance range is .6 Hz to 18 Hz.

Question #6: **Surge Volt:** 1.0Vrms  
↕  
600Vrms

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. (In this case 10% of 60 Hz is .6 Vrms.) The acceptable range is 1.0 Vrms to 600.0 Vrms.

Question #7: **Sag volt:** 0.0 Vrms  
↕  
599.0 Vrms

Use the number keys to enter the low voltage threshold. The usual value is about 15% below the nominal voltage. The acceptable range is 0.0 to 599.0 Vrms.

Question #8: **Impulse thr:** 20 Vpk  
↕  
6000 Vpk

Use the number keys to enter the value of the smallest impulse you wish the PowerScope to report. Typical thresholds are in the range of 100-250 volts. You may select any value from 20 Vpk to 6000 Vpk.

**NOTE:** You will only see the next question if you have selected MANUAL impulse ranging in the Key Operator Menu.

Question #9: **Imp. Range:** 400 Vpk  
800 Vpk  
1600 Vpk  
3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.

**NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold  
selected in previous  
question is between . . .

20 - 50 volts  
51 - 100 volts  
101 - 200 volts  
201 - 400 volts  
401 - 800 volts  
801 - 1600 volts  
1601....

And Auto Impulse  
range in the Key  
Operator Menu is  
turned on . . .

The Impulse Range  
will set automatically  
to . . .

+/- 100 volts  
+/- 200 volts  
+/- 400 volts  
+/- 800 volts  
+/- 1600 volts  
+/- 3200 volts  
+/- 6400 volts

Question #10:     **Neut-Gnd: 0.1Vrms**



99.9 Vrms

Use the number keys to enter the acceptable AC voltage difference between the neutral and ground lines you are monitoring. You may select any value from 0.1 Vrms to 99.9 Vrms. (Typical thresholds range between 1.0 and 10.0 Vrms.)

Question #11:     **N-G imp thr: 20 Vpk**



6000 Vpk

Use the number keys to enter the value of the smallest neutral-to-ground impulse you want the PowerScope to graph. Typical thresholds range between 50-250 volts. You may select any value from 20 volts to 6000 volts.

**NOTE:** You will only see the next question if you selected MANUAL Impulse Ranging in the Key Operator Menu.

Question #12:     **N-G imp rng: 200 Vpk**  
400 Vpk  
800 Vpk  
1600 Vpk

Use value up/value down keys to select the full-scale impulse range.

**NOTE:** If you selected Auto Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select Auto Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold  
selected in the previous  
question is between . . .

20 - 50 volts  
51 - 100 volts  
101 - 200 volts  
201 - 400 volts  
401 - 800 volts  
801 - 1600 volts  
1601....

And Auto Impulse  
range in the Key Operator  
Menu is turned on . . .

The Impulse Range  
will set automatically  
to . . .

+/- 100 volts  
+/- 200 volts  
+/- 400 volts  
+/- 800 volts  
+/- 1600 volts  
+/- 3200 volts  
+/- 6400 volts

Question #13: **Hi. freq. noise: 1.0 V**



19.9 V

Use the number keys to enter the **high frequency noise disturbance threshold**  
(**measured in peak-to-peak volts**). A typical threshold is 5.0 Vpk. The acceptable range is  
1.0 Vpk to 19.9 Vpk.

**NOTE:** If you are using probes for environmental monitoring there will be additional questions.  
See Chapter 8 for an explanation of environmental thresholds.

**End of Set-up Menu for three-phase wye power**



## Setting up for DC monitoring, or for four independent channels

This section describes how to set-up the PowerScope to monitor DC or different types of AC power using its independent channels. (See Chapter 6 for how to connect the PowerScope for monitoring.)

The procedure for using the Setup Menu is:

- 1) Press the SETUP key.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access these choices.
- 3) Press the down arrow key to go on to the next question.
- 4) Press the HELP! key if you want further explanation about the question.

The first question in the menu will be:

Question #1:   **Summary rpt:**    **Print**  
  **Clear**

**NOTE:** (You'll only get this question if the PowerScope has been monitoring and collected enough data points (about 15 minutes of monitoring) to want to dump that data.

**Use the value up/value down keys to choose whether you want the summary reports and strip charts printed now.** If you choose "Print" the summary reports will be printed immediately, then cleared. If you choose "Clear", the date in the summary reports will be discarded, and nothing will be printed. Always press the down arrow key if you want to go on the next question, or the up arrow key if you want to go back to the previous question.

Question #2:   **Site: BMI 4800 SITE**

**Use the number keys to enter the name of the site where you will be monitoring the power.** The name can be up to 20 characters long. Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear; on the second, a J will appear, and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the 0 SPACE button twice to enter a space. Press the down arrow key to go on the the next question.

Single phase  
Dual 1-phase  
3-phase delta  
3-phase wye

Question #3:   **Type: Ind. channels**

**Use the value up/value down keys to select independent channels.**

Question #4: **Channel setup:** 1  
2  
3  
4

Use the value up/value down keys to select which channel you will be setting thresholds for now. (You will have as many choices as you have channels in your PowerScope.) For the sake of example, let's say there are four channels in your PowerScope, and you want to set up the thresholds for channel 1 first.

Question #5: **Mode:** Off  
AC  
DC  
NEUT-GND

Use the value up/value down keys to select a mode for this channel. You have four choices:

OFF - Turns this channel off.

AC - Allows this channel to monitor AC voltages. It will detect impulses, sags, surges, waveshape faults, noise, and frequency errors.

DC - Allows this channel to monitor DC voltages. It will detect impulses, sags, surges, and noise (but will not monitor for frequency errors).


NEUT-GND - Allows this channel to monitor neutral-to-ground voltages. It will detect impulses, surges, and noise (but will not monitor for sags, frequency errors, or waveshape faults).

For the sake of example, let's say you choose AC monitoring for Channel 1.


Question #6: **Name:** Channel 1

Use the number/letter keypad to enter up to 9 characters from the keyboard to name this channel.

Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear, on the second a J, and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the O SPACE button twice to enter a space. Press the down arrow key to go on to the next question.

Question #7: **Nom. freq.:** .1 Hz  
  
450 Hz

Use the number keys to enter in the nominal frequency of the line you are monitoring. A typical setting is 60.0 Hz.

Question #8: **Freq. tol.:** 0.6  
  
15.0 Hz

Use the number keys to enter, in Hertz, the amount of line frequency deviation from nominal you are willing to tolerate before the PowerScope reports a disturbance. The range is 1% to 30% of your nominal frequency setting. A typical value is 2% of your nominal frequency.

For example, if your nominal frequency setting is:

40.0 Hz, the frequency tolerance range is .4 Hz (1%) to 12 Hz (30%).

If your frequency is 50.0 Hz, the frequency tolerance range is .5 Hz to 15 Hz.

If your frequency is 60.0 Hz, the frequency tolerance range is .6 Hz to 18 Hz.

Question #9: **Surge volt: 1.0 Vrms**



600.0 Vrms

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. (In this case 10% of 450.0 volts is 45.0 Vrms, so the usual value would be 495 Vrms.) The acceptable range is 1.0 Vrms to 600.0 Vrms. Let's assume you want the usual setting, and enter 495.0 Vrms. Press the down arrow key to go on to the next question.

Question #10: **Sag volt: 0.0 Vrms**



599.0 Vrms

Use the number keys to enter the low voltage threshold. The usual value is about 15% below the nominal voltage. Fifteen percent of 450 Vrms is 67.5, so the usual value in this case would be 382.5 Vrms. The acceptable range is 0.0 to 599.0 Vrms. For the sake of example, you enter in 382.5, and press the down arrow to go to the next question.

**NOTE:** The surge voltage threshold and the Sag voltage threshold are interdependent. For example, if you select a sag threshold that exceeds the surge threshold setting, your PowerScope will light with the message: "Adjusting surge threshold", then readjust the surge threshold to a value just over the sag threshold you've set. If you set a surge threshold that is lower than the sag threshold, the display reads "Adjusting sag threshold".

Question #11: **Impulse thr: 20 Vpk**



6000 Vpk

Use the number keys to enter the value of the smallest impulse you wish the Power Scope to report. Typical thresholds are in the range of 100-250 volts. You may select any value from 20 Vpk to 6000 Vpk.

**NOTE:** You will only see the next question if you selected MANUAL Impulse Ranging in the Key Operator Menu.

Question #12: **Imp. range: 400 Vpk**

800 Vpk

1600 Vpk

3200 Vpk

Use the value up/value down keys to select the full-scale impulse range.



**NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #13: **Hi. freq. noise: 1.0 Vpk**



19.9 Vpk

Use the number keys to enter the high frequency noise disturbance threshold (measured in peak-to-peak volts). A typical threshold is 5.0 Vpk. The acceptable range is 1.0 Vpk to 19.9 Vpk.

Question #14: **Channel setup:**

- 1
- 2**
- 3
- 4

Use the value up/value down keys to indicate which channel you will be setting thresholds for now. For the sake of example, let's assume you will set up Channel 2 now.

Question #15: **Mode:**

OFF  
AC  
**DC**  
NEUT-GND

Use the value up/value down keys to select a mode for Channel 2. Again, you have four choices as indicated above. Let's assume that you want to monitor DC power on this channel.

Question #16: **Name: Channel 2**

Use the number keys to enter up to 9 characters to name this channel.

Question #17: **Surge volt: 1.0 Vdc**



600.0 Vdc

Use the number keys to enter the high voltage threshold. The usual value is about 10% above the nominal voltage. The acceptable range is 1.0 Vdc to 600.0 Vdc.

Question #18: Sag volt: 0.0 Vdc

  
599.9 Vdc

Use the number keys to enter the low voltage threshold. The usual value is about 10% below the nominal voltage. The acceptable range is 0.0 to 599.0 Vdc.

Question #19: Impulse thr: 20 Vpk

  
6000 Vpk

Use the number keypad to enter the value of the smallest impulse you wish the PowerScope to report. Typical thresholds are in the range of 100-250 Volts. You may select any value from 20 to 6000 volts.

**NOTE:** You will only see the next question if you have selected MANUAL Impulse Ranging in the Key Operator Menu.

Question #20: Imp. range: 400 Vpk  
800 Vpk  
1600 Vpk  
3200 Vpk


Use the value up/value down keys to select the full-scale impulse range. Press the down arrow to go on to the next question.

**NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #21: Hi. freq. noise 1.0 Vpk

  
19.9 Vpk





**NOTE:** If you selected AUTO Impulse Ranging in the Key Operator Menu, you will not see this question.

If you plan to select AUTO Impulse Ranging in the Key Operator Menu, the setting you make here will default according to the impulse threshold you selected in the previous question as follows:

If Impulse Threshold selected in previous question is between . . .	And Auto Impulse range in the Key Operator Menu is turned on . . .	The Impulse Range will set automatically to . . .
20 - 50 volts		+/- 100 volts
51 - 100 volts		+/- 200 volts
101 - 200 volts		+/- 400 volts
201 - 400 volts		+/- 800 volts
401 - 800 volts		+/- 1600 volts
801 - 1600 volts		+/- 3200 volts
1601....		+/- 6400 volts

Question #28: **Hi. freq. noise: 1.0 Vpk**



19.9 Vpk

Use the number keys to enter the high frequency noise disturbance threshold (measured in peak-to-peak volts). A typical threshold is 5.0 Vpk. The acceptable range is 1.0 Vpk to 19.9 Vpk.

1  
2  
3  
4

Question #29: **Channel setup:**

Use the value up/value down keys to select which channel you will be setting thresholds for now.

You select Channel 4.

Question #30: **Mode:** Off  
AC  
DC  
NEUT-GND

Use the value up/value down keys to select a mode for this channel. You turn Channel 4 off.

**NOTE:** If you are using probes for environmental monitoring there will be additional questions. See Chapter 8 for an explanation of environmental thresholds.

**End of Setup Menu for Independent Channels**



## Chapter 2 Presenting and Summarizing Output: Using the Report Menu

The Report Menu lets you choose the summary reports your PowerScope prints. Generally, you don't need to use the Report Menu; the PowerScope automatically defaults to reasonable settings for all the questions in the Report Menu from your answers in the Set-up Menu. But if you want to adjust the reports that get printed, go ahead and use this menu.

The procedure for using the Report Menu is:

- 1) Press the REPORT MENU key
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access these choices.
- 3) Press the down arrow to go to the next question.
- 4) Press the HELP! key if you want further explanation about the questions.

### Report Menu Questions when Setup is for Single-Phase Monitoring

Question #1: **Threshold report:**      **On**  
   **Off**

Use the value up/down keys to turn the Threshold report on or off. The Threshold report is the list of thresholds and settings your PowerScope prints before beginning to monitor. Generally, you should leave the Threshold report on; if you don't want to see the Threshold report, after you press the MONITOR key, immediately press the up arrow, and the threshold reports will be cancelled.

Question #2: **Initial waves:**      **On**  
   **Off**

Use the value/up value down keys to turn the Initial Waveshape reports on or off. The Initial Waveshape report shows the condition of the sine waves at the beginning of the monitoring session. Generally, you will want to leave the Initial Waveshape reports on. (Pressing the MONITOR key, then immediately pressing the up arrow will cancel this report as well.)

Question #3: **Strip charts:**      **24Hr**  
   12Hr  
   6Hr  
   3Hr  
   1Hr  
   Off

Use the value up/value down keys to select the interval in which your PowerScope should print strip chart reports. If you select "3Hr", for example, you PowerScope will print a summary of all its monitoring signals, and all of its strip charts, every three hours. If you have more than 2 environmental probes installed, only the 12Hr and 24Hr choices will be



**NOTE:** The strips chart interval you choose here affects the selections you have in the forthcoming questions...

Question #4: **LINE-NEUT Rms:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the level of detail for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous question, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #5: **LINE-NEUT HFN:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Line-to-Neutral High Frequency Noise signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #6: **LINE-NEUT Freq:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Line-to-Neutral Frequency signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Text", your PowerScope will print a report of all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #7: **LINE-NEUT Wave:**      **On**  
Off

Use the value up/value down keys to turn Line-to-Neutral Waveshape Fault Graphs on or off.



Question #8: **LINE-NEUT Imp:**      **On**  
   **Off**

Use the value up/value down keys to turn Line-to-Neutral Impulse graphs on or off.

Question #9: **NEUT-GND Rms:**      **Both**  
   **Strip Chart Interval**  
   **Graph**  
   **Off**

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #10: **NEUT-GND HFN:**      **Both**  
   **Strip Chart Interval**  
   **Graph**  
   **Off**

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #11: **NEUT-GND Imp.:**      **On**  
   **Off**

Use the value up/value down keys to turn Neutral-to-Ground Impulse graphs on or off.

If you are using probes, there will be more questions. See Chapter 8 for an explanation of Report Menu questions for probes.

**End of Report Menu for Single Phase Monitoring**

## Report Menu Questions for Dual 1-Phase Monitoring

Question #1: **Threshold report:**       **On**  
  **Off**

Use the value up/down keys to turn the Threshold report on or off. The Threshold report is the list of thresholds and settings your PowerScope prints before beginning to monitor. Generally, you should leave the Threshold report on; if you don't want to see the Threshold report, after you press the MONITOR key, immediately press the up arrow, and the threshold reports will be cancelled.

Question #2: **Initial waves:**       **On**  
  **Off**

Use the value up/value down keys to turn the Initial Waveshape reports on or off. The Initial Waveshape report shows the condition of the sine waves at the beginning of the monitoring session. Generally, you will want to leave the Initial Waveshape reports on.

Question #3: **Strip charts:**       **24Hr**  
  12Hr  
  6Hr  
  3Hr  
  1Hr  
  **Off**

Use the value up/value down keys to select the interval in which your PowerScope should print strip chart reports. If you select "3Hr", for example, your PowerScope will print a summary of all its monitoring signals, and all of its strip charts, every three hours. If you have more than 2 environmental probes installed, only the 12Hr and 24Hr choices will be presented. If you choose "Off", no summary reports will be printed and no strip charts will be printed.

**NOTE:** The strips chart interval you choose here affects the selections you have in the forthcoming questions...

Question #4: **LINE-NEUT Rms:**       **Both**  
  Strip Chart Interval  
  Graph  
  **Off**

Use the value up/value down keys to select the level of detail for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous question, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #5: **LNE-NEU A HFN:**     **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the High Frequency Noise disturbances on the Line A-to-Neutral signal. The selections are explained above.

Question #6: **LNE-NEU A Freq:**     **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Line A-to-Neutral Frequency signal. The selections are explained above.

Question #7: **LNE-NEU A Wave:**     **On**  
Off

Use the value up/value down keys to turn Line A-to-Neutral Waveshape Fault Graphs on or off.

Question #8: **LNE-NEU A Imp:**     **On**  
Off

Use the value up/value down keys to turn Line A-to-Neutral Impulse graphs on or off.

Question #9: **NEU-GND A Rms:**     **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #10: **NEU-GND A HFN:**     **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for



Question #11: **NEU-GND A Imp.:** **On**  
**Off**

Use the value up/value down keys to turn Neutral-to-Ground Impulse graphs on or off.

Question #12: **LNE-NEU B Rms:** **Both**  
**Strip Chart Interval**  
**Graph**  
**Off**

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #13: **LNE-NEU B HFN:** **Both**  
**Strip Chart Interval**  
**Graph**  
**Off**

Use the value up/value down keys to select the type of reporting you'd like for this signal. The selections are explained above.

Question #14: **LNE-NEU B Freq:** **Both**  
**Strip Chart Interval**  
**Text**  
**Off**

Use the value up/value down keys to select the kind of reporting you'd like for the Line A-to-Neutral Frequency signal. The selections are explained above.

Question #15: **LNE-NEU A Wave:** **On**  
**Off**

Use the value up/value down keys to turn the Line A-to-Neutral Waveshape Fault graphs on or off.

Question #16: **LNE-NEU B Imp.:** **On**  
**Off**

Use the value up/value down keys to turn Neutral-to-Ground Impulse graphs on or off. (If you choose On, the PowerScope will print a summary graph of this signal as often as you specified in Question #3.)

Question #17: **NEU-GND B Rms:** **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal.

Question #18: **NEU-GND B HFN:** **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal.

Question #19: **NEU-GND Imp.:** **On**  
Off

Use the value up/value down keys to turn Neutral-to-Ground Impulse graphs on or off.

If you are using probes, there will be more questions. See Chapter 8 for an explanation of Report Menu questions for probes.

**End of Report Menu for Dual 1-Phase Monitoring**



## Report Menu Questions for 3-Phase Delta Monitoring

Question #1: **Threshold report:**      **On**  
   **Off**

**Use the value up/down keys to turn the Threshold report on or off.** The Threshold report is the list of thresholds and settings your PowerScope prints before beginning to monitor. Generally, you should leave the Threshold report on; if you don't want to see the Threshold report, after you press the MONITOR key, immediately press the up arrow, and the threshold reports will be cancelled.

Question #2: **Initial waves:**      **On**  
   **Off**

**Use the value/up value down keys to turn the Initial Waveshape reports on or off.** The Initial Waveshape report shows the condition of the sine waves at the beginning of the monitoring session. Generally, you will want to leave the Initial Waveshape reports on.

Question #3: **Strip charts:**      **24Hr**  
   12Hr  
   6Hr  
   3Hr  
   1Hr  
   **Off**

**Use the value up/value down keys to select the interval in which your PowerScope should print strip chart reports.** If you select "3Hr", for example, your PowerScope will print a summary of all its monitoring signals, and all of its strip charts, every three hours. If you have more than 2 environmental probes installed, only the 12Hr and 24Hr choices will be presented. If you choose "Off", no summary reports will be printed and no strip charts will be printed.

**NOTE:** The strips chart interval you choose here affects the selections you have in the forthcoming questions...

Question #4: **PHASE A-B Rms:**      **Both**  
   Strip Chart Interval  
   Graph  
   **Off**

**Use the value up/value down keys to select the level of detail for this signal.** If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous question, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #5: **PHASE A-B HFN: Both**

Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the High Frequency Noise disturbances on the Phase A-to-B signal. The selections are explained above.

Question #6: **PHASE A-B Freq: Both**

Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase A-to-B Frequency signal. The selections are explained above.

Question #7: **PHASE A-B Wave: On**

Off

Use the value up/value down keys to turn Phase A-to-B Waveshape Fault graphs on or off.

Question #8: **PHASE A-B Imp: On**

Off

Use the value up/value down keys to turn the Phase A-to-B Impulse graphs on or off.

Question #9: **PHASE B-C Rms: Both**

Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #10: **PHASE B-C HFN: Both**

Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for

Question #11: **PHASE B-C Freq:**    **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase B-to-C Frequency signal. The selections are explained above.

Question #12: **PHASE B-C Wave:**    **On**  
Off

Use the value up/value down keys to turn Phase B-to-C Waveshape Fault Graphs on or off.

Question #13: **PHASE A-B Imp:**    **On**  
Off

Use the value up/value down keys to turn the Phase B-to-C Impulse graphs on or off.

Question #14: **PHASE C-A Rms:**    **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #15: **PHASE C-A HFN:**    **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. The selections are explained above.

Question #16: **PHASE C-A Freq:**    **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase C-to-A Frequency signal. The selections are explained above.

Question #17: **PHASE C-A Wave:** On  
Off

**Use the value up/value down keys to turn Phase C-to-A Waveshape Fault Graphs on or off.**

Question #18: **PHASE C-A Imp:** **On**  
**Off**

**Use the value up/value down keys to turn the Phase C-to-A Impulse graphs on or off.**

If you are using probes, there will be more questions. See Chapter 8 for an explanation of Report Menu questions for probes.

### End of Report Menu for 3-Phase Delta Monitoring



## Report Menu Questions for 3-Phase Wye Monitoring

Question #1: **Threshold report:**      **On**  
   **Off**

Use the value up/down keys to turn the Threshold report on or off. The Threshold report is the list of thresholds and settings your PowerScope prints before beginning to monitor. Generally, you should leave the Threshold report on; if you don't want to see the Threshold report, after you press the MONITOR key, immediately press the up arrow, and the threshold reports will be cancelled.

Question #2: **Initial waves:**              **On**  
   **Off**

Use the value up/value down keys to turn the Initial Waveshape reports on or off. The Initial Waveshape report shows the condition of the sine waves at the beginning of the monitoring session. Generally, you will want to leave the Initial Waveshape reports on.

Question #3: **Strip charts:**              **24Hr**  
   **12Hr**  
   **6Hr**  
   **3Hr**  
   **1Hr**  
   **Off**

Use the value up/value down keys to select the interval in which your PowerScope should print strip chart reports. If you select "3Hr", for example, your PowerScope will print a summary of all its monitoring signals, and all of its strip charts, every three hours. If you have more than 2 environmental probes installed, only the 12Hr and 24Hr choices will be presented. If you choose "Off", no summary reports will be printed and no strip charts will be printed.

**NOTE:** The strips chart interval you choose here affects the selections you have in the forthcoming questions...

Question #4: **PH A-NEUT Rms:**      **Both**  
   **Strip Chart Interval**  
   **Graph**  
   **Off**

Use the value up/value down keys to select the level of detail for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous question, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.



Question #5: **PH A-NEUT HFN:** **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the High Frequency Noise disturbances on the Phase A-to-Neutral signal. The selections are explained above.

Question #6: **PH A-NEUT Freq:** **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase A-to-Neutral Frequency signal. The selections are explained above.

Question #7: **PH A-NEUT Wave:** **On**  
Off

Use the value up/value down keys to turn Phase A-to-Neutral Waveshape Fault Graphs on or off.

Question #8: **PH A-NEUT Imp:** **On**  
Off

Use the value up/value down keys to turn Phase A-to-Neutral Impulse graphs on or off.

Question #9: **PH B-NEUT Rms:** **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #10: **PH B-NEUT HFN:** **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for

Question #11: **PH B-NEUT Freq:**    **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase B-to-Neutral Frequency signal. The selections are explained above.

Question #12: **PH B-NEUT Wave:**    **On**  
Off

Use the value up/value down keys to turn Phase B-to-Neutral Waveshape Fault Graphs on or off.

Question #13: **PH B-NEUT Imp:**    **On**  
Off

Use the value up/value down keys to turn Phase B-to-Neutral Impulse graphs on or off.

Question #14: **PH C-NEUT Rms:**    **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #15: **PH C-NEUT HFN:**    **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. The selections are explained above.

Question #16: **PH C-NEUT Freq:**    **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the Phase C-to-Neutral Frequency signal. The selections are explained above.

Question #17: **PH C-NEUT Wave:**      **On**  
   **Off**

Use the value up/value down keys to turn Phase C-to-Neutral Waveshape Fault Graphs on or off.

Question #18: **PH C-NEUT Imp:**      **On**  
   **Off**

Use the value up/value down keys to turn the Phase C-to-Neutral Impulse graphs on or off.

Question #19: **NEUT-GND Rms:**      **Both**  
   Strip Chart Interval  
   Graph  
   Off

Use the value up/value down keys to select the type of reporting you'd like for **this signal**. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #20: **NEUT-GND HFN:**      **Both**  
   Strip Chart Interval  
   Graph  
   Off

Use the value up/value down keys to select the type of reporting you'd like for **this signal**. The choices are explained above.

Question #21: **NEUT-GND Imp:**      **On**  
   **Off**

Use the value up/value down keys to turn the Neutral-to-Ground Impulse graphs on or off.

If you are using probes, there will be more questions. See Chapter 8 for an explanation of Report Menu questions for probes.

**End of Report Menu for 3-Phase Wye Monitoring**



## Report Menu Questions for Four Independent Channels

For this exercise, we'll demonstrate the setup as if:

Channel 1 is monitoring AC  
Channel 2 is monitoring DC  
Channel 3 is monitoring Neutral-to-Ground, and  
Channel 4 is turned OFF.

Question #1: **Threshold report:**      **On**  
   **Off**

Use the value up/down keys to turn the Threshold report on or off. The Threshold report is the list of thresholds and settings your PowerScope prints before beginning to monitor. Generally, you should leave the Threshold report on; if you don't want to see the Threshold report, after you press the MONITOR key, immediately press the up arrow, and the threshold reports will be cancelled.

Question #2: **Initial waves:**              **On**  
   **Off**

Use the value up/value down keys to turn the Initial Waveshape reports on or off. The Initial Waveshape report shows the condition of the sine waves at the beginning of the monitoring session. Generally, you will want to leave the Initial Waveshape reports on.

Question #3: **Strip charts:**              **24Hr**  
   12Hr  
   6Hr  
   3Hr  
   1Hr  
   Off

Use the value up/value down keys to select the interval in which your PowerScope should print strip chart reports. If you select "3Hr", for example, your PowerScope will print a summary of all its monitoring signals, and all of its strip charts, every three hours. If you have more than 2 environmental probes installed, only the 12Hr and 24Hr choices will be presented. If you choose "Off", no summary reports will be printed and no strip charts will be printed.

**NOTE:** The strips chart interval you choose here affects the selections you have in the forthcoming questions...

Question #4: **CHANNEL 1 Rms:**      **Both**  
   Strip Chart Interval  
   Graph  
   Off

Use the value up/value down keys to select the level of detail for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous question, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your

signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports. (The name of this channel might not be Channel 1. Actually, whatever name(s) you entered in the Setup Menu will appear in all the questions in this menu.)

Question #5: **CHANNEL 1 HFN:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the kind of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #6: **CHANNEL 1 Freq:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the previous Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Text", your PowerScope will print a report of all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #7: **CHANNEL 1 Wave:**      **On**  
Off

Use the value up/value down keys to turn Channel one's Waveshape Fault Graphs on or off.

Question #8: **CHANNEL 1 Imp:**      **On**  
Off

Use the value up/value down keys to turn this Impulse graph on or off.

Question #9: **NEUT-GND Vdc:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. The selections are explained in Question #6.



Question #10: **NEUT-GND HFN:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal. If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3, but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Graph", your PowerScope will graph all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

Question #11: **NEUT-GND Wave:**      **On**  
Off

Use the value up/value down keys to turn the Neutral-to-Ground Waveshape Fault Graphs on or off.

Question #12: **NEUT-GND Imp:**      **On**  
Off

Use the value up/value down keys to turn this Impulse graph on or off.

Question #13: **NEUT-GND Rms:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal.

Question #14: **NEUT-GND HFN:**      **Both**  
Strip Chart Interval  
Graph  
Off

Use the value up/value down keys to select the type of reporting you'd like for this signal.

Question #15: **NEUT-GND Imp:**      **On**  
Off

Use the value up/value down keys to turn this Impulse graph on or off.

If you are using probes, there will be more questions. See Chapter 8 for an explanation of Report Menu questions for probes.

**End of Report Menu for Four Independent Channels**

## Chapter 3 Customizing the Application: Using the Key Operator Menu


The Key Operator menu lets you control the internal settings of your PowerScope, including the date and the time.

The procedure for using the key operator menu is:


- 1) Press the SETUP MENU key, then the up arrow.
- 2) Answer the questions in the menu. Most questions have choices. Press the value up/value down keys to access these choices.
- 3) Press the down arrow to go to the next question.
- 4) Press the HELP! key if you want further explanation about the questions.

Question #1: **Help:**      **English**  
                                 **French**

Use the value up/value down keys to select the language you prefer. This controls the language of the Help messages which are printed when you press the Help! key; the menus and reports are always printed in English.

Question #2: **Wave shp:**      **0.1 cycles**  
                                   
                                 **9.9 cycles**

Use the number keys to enter the minimum duration threshold for wave shape faults. A typical value is 0.2 cycles. The acceptable range of answers is 0.1 cycles to 9.9 cycles. A wave shape fault that is shorter than the minimum duration that you enter here will not trigger a wave shape fault disturbance graph; any wave shape fault that is longer than the minimum duration that you enter here will trigger a wave shape fault disturbance graph.

Question #3: **Wave tolerance:**      **2%**  
                                   
                                 **99%**

Use the number keys to enter the tolerance amplitude of the wave shape detection window. Wave shape faults are detected by comparing each cycle of the sine wave to the previous cycle. This entry is the minimum amount, as a percentage of full scale, that a cycle must differ from the previous cycle to be considered a fault. A typical value is 20%; the acceptable range is 2% to 99%, although most power lines will trigger constantly at 2%, and will never trigger at 99%.

Question #4: **Hysteresis** 1.0%



5.0%

Use the number keys to enter the amount of hysteresis you prefer for surge and sag measurements. Hysteresis refers to the "snap action" in a threshold; it is a way of assuring that a signal that is right at a threshold is considered to be either above the threshold or below the threshold, and isn't considered to be bouncing back and forth through the threshold. The hysteresis is specified as a percentage of full scale, and is used for voltage surge and sag measurements (and environmental measurements as well). For example, if you have a surge voltage threshold of 125.0 Vrms on the 250.0 Vrms full scale range, and you choose a hysteresis of 1% (or 2.5 Vrms = 1% x 250 Vrms), a surge will be reported when the input voltage crosses 125.0 Vrms, and the surge will end when the input voltage drops below 122.5 Vrms (125.0 Vrms (125.0 Vrms - 2.5 Vrms)).

A typical value for hysteresis is 1.0%. The acceptable range for hysteresis is 0.0% to 5.0%. At 0.0%, the hysteresis function is disabled.

Question #5: **Impulse range:** Auto  
Manual

Use the value up/value down keys to choose automatic or manual impulse range selection. If you choose automatic impulse range selection, your PowerScope will examine the impulse thresholds that you set in the Set-up menu, and will choose a full-scale range that gives a good compromise between resolution and full scale ability, according to the following table:

Automatic Impulse Full-scale Range Selection

Impulse threshold	Full-scale range
20 Vpk - 50 Vpk	100 Vpk full scale
51 Vpk - 100 Vpk	200 Vpk full scale
101 Vpk - 200 Vpk	400 Vpk full scale
201 Vpk - 400 Vpk	800 Vpk full scale
401 Vpk - 800 Vpk	1,600 Vpk full scale
801 Vpk - 1,600 Vpk	3,200 Vpk full scale
1,601 Vpk - 6,400 Vpk	6,400 Vpk full scale


However, if you choose manual impulse range selection, your PowerScope will ask you to choose a full-scale range for impulses each time you enter an impulse threshold in the Set-up menu. Your PowerScope will not allow you to select a full-scale range that is less than two times your impulse threshold or greater than 16 times your impulse threshold:

Manual Impulse Full-scale Range Selection


Full-scale	Acceptable thresholds
100 Vpk	20 - 50 Vpk
200 Vpk	20 - 100 Vpk
400 Vpk	20 - 200 Vpk
800 Vpk	50 - 400 Vpk
1600 Vpk	100 - 800 Vpk
3200 Vpk	200 - 1600 Vpk
6400 Vpk	400 - 6000 Vpk



In applications where you know the size of impulses that disrupt your equipment, it makes sense to choose automatic impulse ranging. In applications where you're trying to characterize a power line, it may make more sense to choose manual impulse ranging, and then select the largest full-scale range available.

Question #6:    **Line imp.:**        **1 ohms**  
     
   **9,999 ohms**


**Use the number keys to enter the estimated impedance of the power line at impulse frequencies.** The impedance is used in the calculation of approximate impulse energy. It has a second-order effect (the calculation is dominated by the integral of the voltage, which is squared). Fifty ohms is a reasonable value, unless you are measuring downstream from a power conditioner, where a value of a few hundred ohms is more typical. The acceptable range of values is 1 ohm to 9,999 ohms. For a discussion of typical values, see J.H. Bull, "Impedance of the Mains Supply at Radio Frequencies", Proceedings of the 1st Symposium on EMC, MONTREUX, 75CH1012-4, pp. 357-362, May 1975.

Question #7:    **Freq. tolerance:**        **0.1 %**  
     
   **9.9 %**

**Use the number keys to enter the power line frequency threshold tolerance.** This tolerance will be used to trigger high-line frequency and low-line frequency disturbance reports. The tolerance is expressed as a percentage of the nominal frequency. A typical value is 1.0%; the acceptable range is 0.1% to 9.9%.

Question #8:    **Temp. units:**        **C**  
   **F**

**Use the value up/value down keys to select temperature readings in Centigrade or Fahrenheit.** This controls both temperature probes and temperature/humidity probes.

Question #9:    **Internal UPS:**        **0 min**  
     
   **15 min**

**Use the number keys to enter the length of time that you want the batteries to support the PowerScope while it is monitoring.** The UPS (Uninterruptible Power Supply) that is built into the PowerScope can operate it during a power failure. The PowerScope will only consume battery power if it's monitoring; a power failure while you're setting up your PowerScope will cause a simple power-down procedure. With fully charged batteries, your PowerScope can continue to monitor for 15 minutes after a power failure. However, you may want to restrict it to 5 minutes, so that it doesn't completely consume its battery power during the first power failure that occurs. Typical value is 5 minutes; the acceptable range is 0 minutes to 15 minutes.

Question #10:    **Keyboard click:**        **On**  
   **Off**



Use the value up/value down keys to turn the keyboard click on or off. The keyboard click is a brief, high pitched tone that sounds each time you press a key.

Question #11: **Current month:** Jan

Feb

Mar

Apr

May

June

July

Aug

Sept

Oct

Nov

Dec

Use the value up/value down keys to select the current month.

Question #12: **Day of month:**

1



31

Use the number keys to enter the current date.

Question #13: **Current year:**

1986



2099

Use the number keys to enter the current year. Acceptable values are 1986 to 2099.

Question #14: **Date:** U.S. standard

Eur. standard

Use the value up/value down keys to select the date format you prefer. The U.S. standard form is January 12, 1987; the European standard for the same date is 12 January, 1987.

Question #15: **Current hour:**


0



23

Use the number keys to enter the current hour on a 24 hour clock. You must use a 24-hour clock

to enter the hour, even if you select AM/PM displays in the next menu item. For example, if it is 6:00 in the evening, you must enter 18 here. The acceptable range is 0 to 23.

Question #16: **Current minute:** 1  
  
59

Use the number keys to enter the current minute within the hour. The clock will actually be set to this time when you step off this question. The seconds in the clock will be set to zero. (If you don't change the value as you step through this question the clock will not be disturbed.)

Question #17: **Time:** A.M./P.M.  
24 hour

Use the value up/value down keys to select A.M./P.M. or military (24 hour) time display.

Question #18: **MEM #1 Name:** MEMORY #1

Use the number keys to enter a name for the first set-up memory slot. The name can be up to 9 characters long; typically, you'll want to name a memory slot for the type of equipment the set-up is used from. There are three memory slots - for information on how to use them, see Chapter 4 on Storing and Recalling Setups.

Use the left arrow and right arrow keys to move the flashing cursor. Use the number keys to enter both letters and numbers; for example, to enter the letter "K", press the 5JKL key 3 times. On the first press, a 5 will appear; on the second, a J will appear; and on the third, a K will appear. Now move the flashing cursor to the next position by pressing the right arrow key. Press the 0 SPACE button twice to enter a space.

Question #19: **MEMORY #1:** Read/Write  
Read only

Use the value up/value down key to control access to this memory slot. If you choose Read/Write, you will be allowed to store your set-up in this memory whenever you want to. But if you have an important set-up stored in this memory already, you may want to select Read only, so that you don't accidentally write over your set-up in this memory slot. (The name at the left of this question may not be "MEMORY #1"; it will be whatever name you chose in the previous question.)

Question #20: **MEM #2 Name:** MEMORY #2

Question #21: **MEMORY #2:** Read/Write  
Read only

Question #22: **MEM #3 Name:** MEMORY #3

Question #23: **MEMORY #3:** Read/Write  
Read only

See questions 18 and 19 above.



## Chapter 4 Storing and Recalling your set-ups in Memory

### Storing set-ups in memory

When you have your PowerScope set up the way you want it, you may want to store your Setup, Report, and Key Operator Menus in one of the PowerScope's memories. The PowerScope's memories are battery powered, so your setup will be safe even if you unplug the PowerScope.

You have room to store up to three different set-ups, so you may want to store the thresholds for your most common applications in memory. For example, if you usually work with Intertek minicomputers, models A-11 and B-12, you may want to set up your PowerScope in your office for each model, and store the set-ups in memory. Then when you go to a site to diagnose a problem, you can recall your set-up with just a few keystrokes.

Here's how you store a set-up in your PowerScope's memory:

**Use the set-up menu to set your PowerScope thresholds.** You're going to store the way the PowerScope is set up right now, so make sure you've chosen the correct power type, thresholds, and so on. (Also stored are the Report and Key Operator Menus as they are set right now.)

**Press the store memory key.**

**Store mem:**    **MEMORY #1**  
                  **MEMORY #2**  
                  **MEMORY #3**  
                  **QUIT**

**Use the value up/value down keys to select the memory you want this set-up stored in.** If you've made a mistake, select QUIT, and nothing will be stored. If the PowerScope won't let you choose anything but QUIT, all three of your memory slots are set to Read Only, and you'll need to check the Key Operator menu. You can also change the names of the memory slots by using the Key Operator menu.

**Press the down arrow key.** Your set-up will be stored in memory, and you can retrieve it at any time with the Recall memory button. Press the SETUP MENU key or another action key to continue operation.

### Recalling your set-ups from memory

When you recall a set-up from memory, it replaces the current PowerScope set-up.

You can recall a set-up with just a few keystrokes (which may be a great deal easier than answering all the questions in the Set-up menu again!). Here's how:

**Press the Recall memory key.**

**Recall mem:**    **DEFAULT**  
                  **MEMORY #1**  
                  **MEMORY #2**  
                  **MEMORY #3**  
                  **QUIT**

**Use the value up/value down keys to select the memory slot you want to recall.** If you choose



DEFAULT, the PowerScope will set all its thresholds to the default settings for 120 VAC, 60 Hz single-phase power. If you choose QUIT, nothing will be recalled, and your current set-up won't be disturbed.

**Press the Down arrow key.** The set-up will be recalled. Press the SETUP MENU key to view the thresholds you've restored to the system, or another action key to resume operation.

## Chapter 5 Locking and Unlocking your PowerScope

PowerScopes are intriguing instruments and sometimes people might inadvertently disrupt one of your important tests. To help you discourage casual tampering, the LOCK key allows you to disable the keyboard.

Here's how to lock your PowerScope's keyboard:

- **Press the LOCK key.** That's all there is to it! The LOCK light will turn on. Your PowerScope will remember that it's locked even if it has been unplugged. Of course, the data that it gathers will be affected if someone unplugs the power.

Here's how to unlock the PowerScope's keyboard:

- **Press the LOCK key, then immediately press the CLEAR key.** Your Power Scope will beep once, and turn off the Lock light.

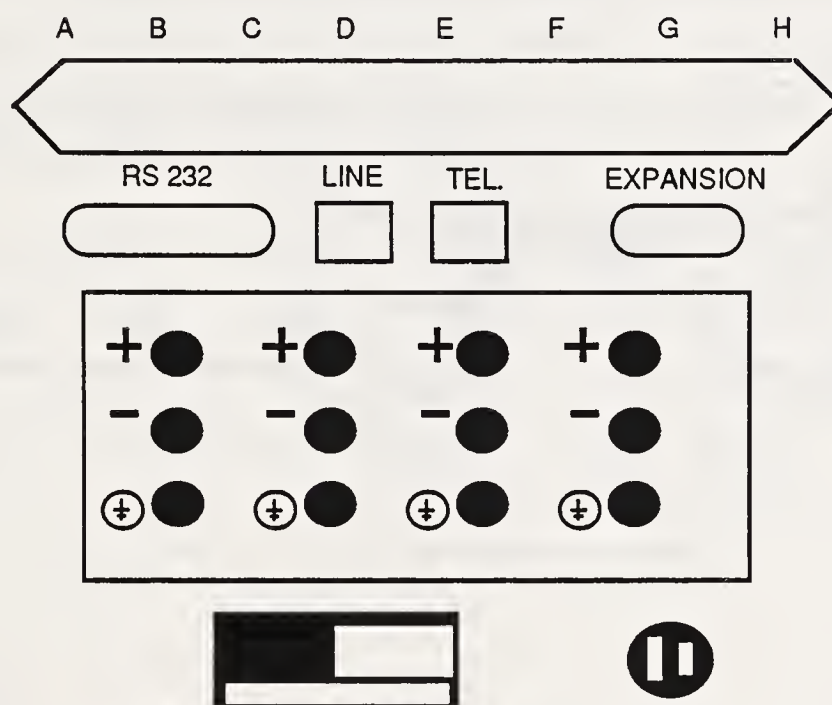


## Chapter 6 Connecting your PowerScope to a power-line

This chapter discusses how to connect your PowerScope to various types of power for monitoring. For an abbreviated version of this chapter, see Appendix F "A Quick Connection Guide". Also see Appendix E, "Description of Cables", for further explanation.

Look at the back panel of your PowerScope. Notice that each channel has three sockets, positive, negative, and ground. No matter how many channels your PowerScope has, the ground sockets access the same ground, so plugging into Channel 1 ground is the same as plugging into Channel 4 ground.

In connecting your PowerScope to monitor, remember that power is measured from one point to another, for example from neutral to ground. That's why each channel has a positive and a negative socket.



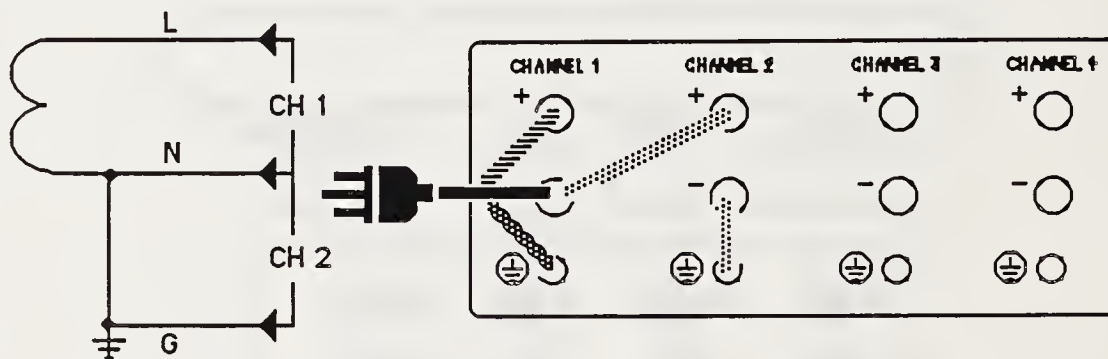


## Connecting to single-phase power

To monitor both lines (phase-to-neutral and neutral-to-ground) of single phase power requires two channels.

Using the single phase measuring cable:

- 1) Connect the green ground connector to ground.
- 2) Connect the red safety connector to Channel 1 positive.
- 3) Connect the black safety connector to a blue jumper connected into Channel 1 negative.
- 4) Connect the other end of the blue safety connector in Channel 2 positive.
- 5) Connect another blue jumper wire from Channel 2 negative to ground.



### LEGEND

RED	
BLACK	
BLUE	
GREEN	

### Explanation of connections

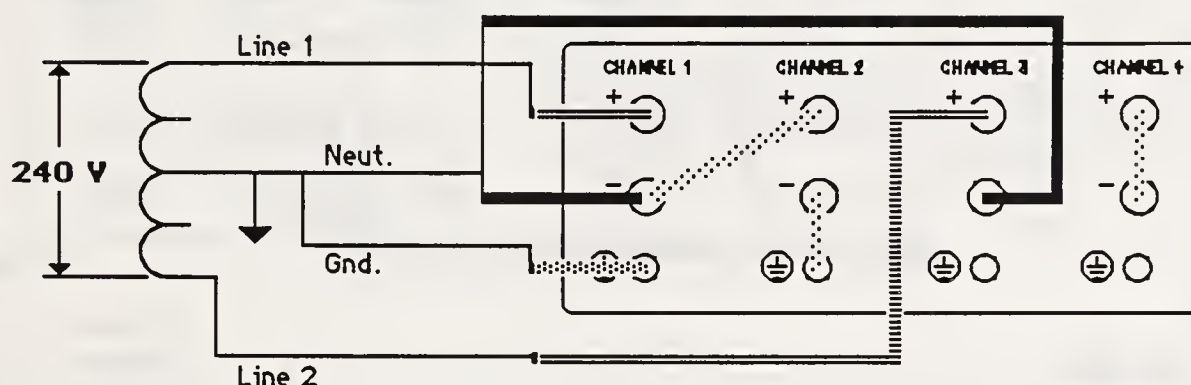
In the diagram above, the connections are made with a single phase measuring cable and two jumper cables. Channel one is connected for monitoring phase (positive socket) to neutral (negative socket). (The green ground plug is connected to the first ground socket, but it could be made into any ground socket on the panel.) Channel two is connected to monitor neutral to ground. A jumper cable is used to connect the neutral line of Channel 1 to the positive socket of Channel two, and a jumper wire is used to make the connection from ground into Channel two's negative socket.

This wiring procedure might change slightly when the PowerScope is powered from a different source than the power you are monitoring and the two sources use separate grounds. In this case, you would plug the ground wire into Channel 2 negative and leave all ground input terminals open.

## Connecting to dual one phase power (for split phases)

To monitor all lines of dual-phase power requires four channels.

- 1) Using a green cable, connect ground into any one of the ground sockets.
- 2) Using a red cable, connect line one to Channel one positive.
- 3) Using a black cable, connect neutral first into a blue jumper cable, then into Channel one negative.
- 4) Connect the other end of the jumper cable into Channel two positive (so your are jumpering between Channel 2 negative and Channel 2 ground).
- 5) Using another black cable, connect Line A into Channel 3 negative.
- 6) Using a red cable, connect Line B to Channel 3 positive.
- 7) Using a jumper cable, connect Channel 4 positive to Channel 4 negative. (This is to alleviate any radio frequency signals an open channel might pick up.)



### LEGEND

RED	=====
BLACK	—————
BLUE	.....
GREEN	—————

### Explanation of connections

In the diagrams above, the connections are made with 2 red cables, 2 black cables, 1 green ground cable, 2 blue jumpers, and 1 blue jumper with a green ground plug.

Channel 1 is connected for monitoring Line A (positive socket) to neutral (negative socket).

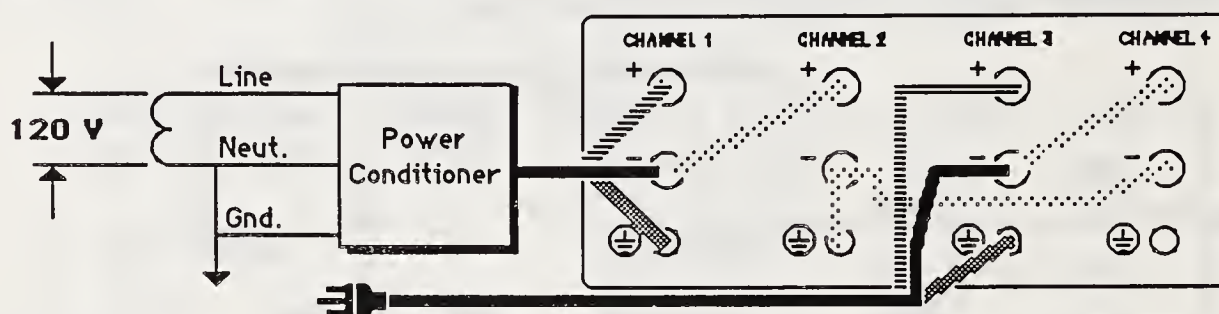
The green ground cable is connected to channel 1 ground, (but it could be made into any ground socket) and channel 2 is connected for monitoring neutral to ground. A blue jumper cable is used to pass the neutral signal into channel 2 positive. Channel 2 negative receives the ground signal via another jumper cable that is jumpered to Channel 2 ground.

Channel 3 is connected for monitoring Line B to neutral. A red cable is connected from Line B to channel 3 positive. The neutral signal in Line 3 negative is obtained with a black cable. Channel 4 is jumpered to avoid RF interference.

## Connecting to Dual 1-Phase (for analyzing a Power Conditioning Device)

To monitor all signals from a power conditioning device requires 4 channels.

- 1) Connect a red cable connect to Channel 1 positive
- 2) Connect a black cable into a blue jumper, then into Channel 1 negative.
- 3) Connect the other end of the jumper to Channel 2 positive.
- 4) Connect the green ground connector to ground.
- 5) Using a measuring cable, connect the red connector to Channel 3 positive, and the black connector to a blue jumper, then into Channel 3 negative.
- 6) Connect the other end of the jumper into Channel 4 positive
- 7) Connect the green ground connector on the measuring cable to Channel 3 ground.



### LEGEND

RED	
BLACK	
BLUE	
GREEN	

### Explanation of Connections

In the diagram above, the connections are made with 2 single-phase measuring cables, 3 blue jumper cables, and 1 blue jumper cable with a green ground plug. A measuring cable is plugged into the power conditioner, so its output signal is received by the PowerScope. The red (phase) connector is connected to the PowerScope's Channel 1 positive socket. The neutral (black) connector is first placed in a blue jumper, then to Channel 1 negative. The green connector of the measuring cable goes to Channel 1 ground. The other end of the blue jumper (neutral signal) is connected to Channel 2 negative.

Another measuring cable, plugged into the wall outlet, is used to provide information on the unconditioned power (the power going into the power conditioner). Its red connector (phase) plugs into Channel 3 positive, its neutral connector (black) first plugs into a blue jumper, then into Channel 3 negative, and its ground connector plugs into Channel 3 ground. The other end of the blue jumper is plugged into Channel 4 positive.

Finally, the blue jumper with ground plug is connected to Channel 2 ground. The other end is first placed into a blue jumper, then into Channel 3 negative. The other end of this blue jumper is placed into Channel 4 negative.

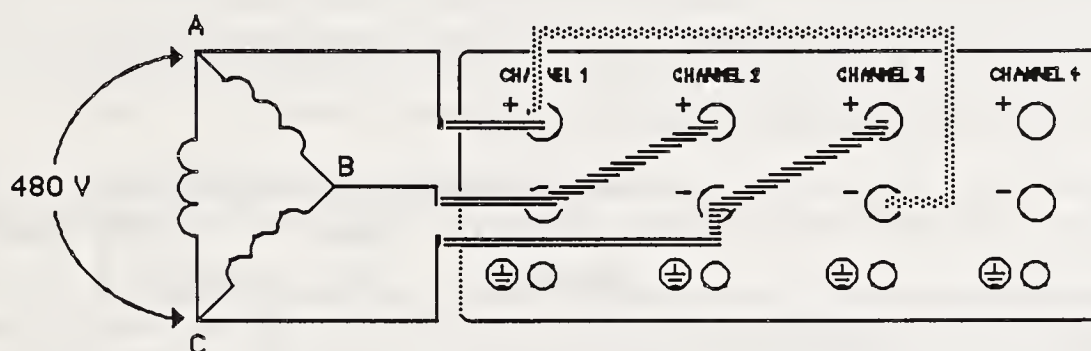
In this way, you are measuring the Power Conditioner's output signal: Phase-to-Neutral on Channel 1, Neutral-to-Ground on Channel 2. The unconditioned signal is measured as follows: Phase-to-Neutral on Channel 3, and Neutral-to-Ground on Channel 4.



## Connecting to 3-Phase Delta

You need three channels to measure three-phase delta power.

- 1) Using a red cable/connect line A to a blue jumper cable, then into Channel 1 positive.
- 2) Connect the other end of the jumper cable to Channel 3 negative.
- 3) Using a red cable/connect line B to a blue jumper cable, then into Channel 1 negative.
- 4) Connect the other end of the jumper cable into Channel 2 positive.
- 5) Using a red cable/connect line C to a blue jumper cable, then into Channel 2 negative.
- 6) Connect the other end of the jumper cable to Channel 3 positive.



### LEGEND

RED	=====
BLACK	—————
BLUE	.....
GREEN	—————

### Explanation of Connections

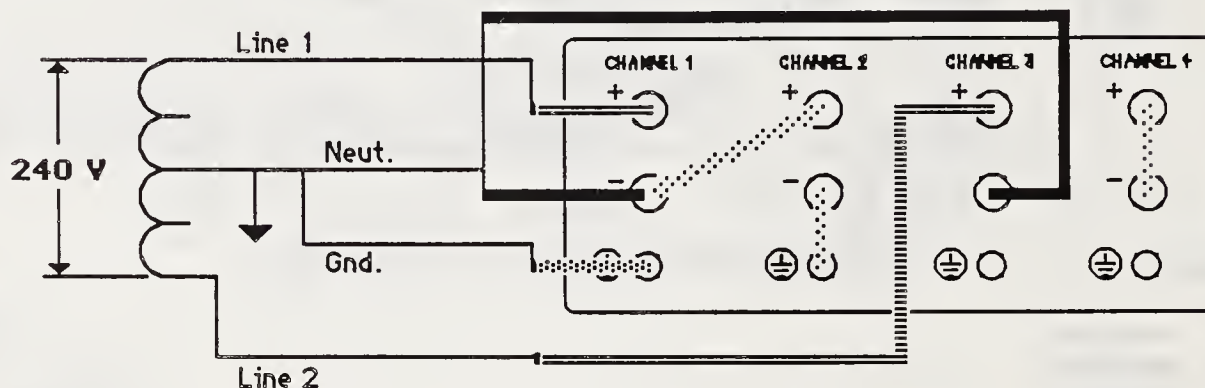
In the diagram above, the connections are made with 3 red cables and 3 blue jumper cables. (positive socket) Channel 1 is connected for monitoring Line A to Line B (negative socket). Channel 2 is connected for monitoring Line B (this signal obtained by jumping it from Channel 1 negative to channel 2 positive) to Line C. Channel 3 is connected for monitoring Line C to Line A. The Line A signal is jumpered from channel 1 positive to channel 3 negative. The line C signal is jumpered from channel 2 negative to channel 3 positive. Channel 4 isn't used.



## Connecting to 3-Phase Wye

You need four channels to monitor three-phase wye power.

- 1) Connect a red cable (Line A) to Channel 1 positive.
- 2) Connect a red cable (Line B) to Channel 2 positive.
- 3) Connect a red cable (Line C) to Channel 3 positive.
- 4) Connect a black cable (neutral) to a blue jumper, then into Channel 1 negative.
- 5) Connect the other end of the jumper cable to Channel 2 negative.
- 6) Connect a blue jumper cable from Channel 2 negative to Channel 3 negative.
- 7) Connect a blue jumper cable from Channel 3 negative to Channel 4 positive.
- 8) Connect a blue jumper cable from Channel 4 negative to Channel 4 ground.
- 9) Connect a green ground cable to Channel 1 ground.



### LEGEND

RED	=====
BLACK	—————
BLUE	.....
GREEN	—————

### Explanation of Connections

In the diagram above, the connections are made with 3 red cables, 1 black cable, 1 green cable, 3 blue jumpers, and 1 blue jumper with a green ground plug.

Channel 1 is connected for monitoring Line A (positive) to neutral (negative). The ground connector is made to the channel 1 socket but it could have been made to anyone of the 4 ground sockets.

Channel 2 is connected for monitoring Line B (positive) to neutral (negative). A blue jumper cable has been used to obtain the neutral signal from channel 1 negative. For channel 2 negative channel 3 is connected for monitoring Line C (positive socket) to neutral (negative socket). Another blue jumper is used to feed the neutral signal into Channel 3 negative. Channel 4 is connected to monitor neutral to ground. The neutral signal is jumpered from channel 3 negative to channel 4 positive. Ground is jumpered into channel 4 negative from the channel 4 ground.

(If you have a 3-phase wye system with no ground, use the three-phase delta setup to monitor phase-to-phase or phase-to-ground on all three channels.)

## Chapter 7 Monitoring Power Lines with Your PowerScope

### Checking the status of power lines

Before you start monitoring for disturbances, you may want to press the STATUS key. The PowerScope will print all the significant voltages and frequencies so you can check to see if you've installed it correctly. It can also give you an idea of what to set your thresholds to. The line connections should be made to the channels before pressing STATUS.

It's a good idea to request a Status Report before setting your thresholds. A status report tells you what the present measurements are so you don't set the thresholds too tightly.

### Monitoring

**Press the MONITOR button to start monitoring the power line.** First you'll get a hard copy of how you've set up the PowerScope. Then you'll get a couple of Initial Waveshape graphs that show you what the power line looked like the instant you started monitoring. Then, every time there's a disturbance, your PowerScope will print a disturbance report.

You may get Impulse graphs, waveshape disturbances, Voltage sags and surges, High-frequency noise bursts, Frequency disturbances, or Summary reports and Summary strip charts.

Frequently, many disturbances happen in a short period of time. All power disturbances will be recognized by your PowerScope, which can store as many as 60 graphs. Disturbances occurring while the graph memory is full will not appear as a graph, but will be counted and added to the summary information. A message will appear at the bottom of your graph telling you how many disturbances were recorded during recovery.

**NOTE:** (If you have set your thresholds too tightly, you may get a constant stream of disturbance graphs. To cancel one graph, press the CANCEL PRINTER key. To cancel everything, press the CANCEL PRINTER key, then the up arrow. It may take a few seconds for your PowerScope to reset.)



# Chapter 8 Monitoring the Environment with Your PowerScope

## The Environmental Inputs

On the back of your PowerScope, you'll notice 8 sockets across the top labeled A through H. These sockets are for environmental probes such as for measuring temperature and humidity. The PowerScope will graph these environmental measurements from probes attached to these inputs over whatever time period you specify in the Report Menu.

To install an environmental probe, just plug it into one of the sockets and place the probe in a good place for monitoring the environment.

Be sure you install the probes before you answer questions in the Setup and Report Menus so the PowerScope supplies you with the appropriate threshold questions.


## Setup Menu Questions for Probes

### Temperature probes

The Temperature probe used with the PowerScope monitors the temperature and also the rate of temperature change, and graphs this output over the time period you specify in the Report Menu.

If you have a temperature probe installed into one or more of the environmental channels, you will be asked to choose a high temperature threshold range, a low temperature threshold range, and a rate of temperature change threshold in the Setup Menu. For the sake of example, let's say you have a temperature probe plugged into Channel A. The setup Menu will ask you these questions:

Question #1: **Sensor Setup:**

A  
B  
C  
D  
  
H

Use the value up/value down keys to select which environmental probe you will be setting thresholds for now. For the sake of example, let's say you have a temperature probe plugged into environmental channel A and will set thresholds for it now.

Question #2: **Name: Ambient A**

Use the letter/number keypad to enter in up to 9 characters to name this probe. Let's say you name it COMPUTER.

Question #3: **COMPUTER high 86°F**

Use the number keys to enter in a high temperature threshold for this probe. The range is 32°F to 212°F (1° C to 100°C). A typical value is 86°F (30°C).

Question #4: **COMPUTER low 59°F**

Use the number keys to enter in a low temperature threshold for this probe. The range is 32°F to



Use the number keys to enter in a low temperature threshold for this probe. The range is 32°F to 210°F (0°C to 99°C). A typical value is 59°F (15°C).

Question #5: **COMPUTER 5°F/hr**

Use the number keys to enter in a rate-of-temperature-change threshold for this probe. The rate-of-temperature-change is in degrees per hour. The acceptable range is 2°F to 178°F (1°C to 99°C). A typical value is 5°F/hr (3°C/hr).

### Temperature/humidity probes

The Temperature/Humidity probe used with the PowerScope measures temperature, rate of temperature change, humidity, and rate of humidity change.

If you have a temperature/humidity probe plugged into one or more of the environmental channels, you will be asked to set thresholds for these measurements in the Setup Menu.

Question #1: **Sensor Setup:**

A  
B  
C  
D  
  
H

Use the value up/value down keys to select which environmental probe you will be setting thresholds for now. For the sake of example, let's say you have a temperature/humidity probe plugged into environmental channel B and will set thresholds for it now.

Question #2: **Name: Ambient B**

Use the number/letter keypad to enter up to 9 characters to name this probe. Let's say you name it AIR DUCT.

Question # 3: **Ambient AIR DUCT high:**

32°F (1°C)



212°F (100°C)

Use the number keys to enter the high temperature threshold for this probe. The acceptable range is 32°F to 212°F (1°C to 100°C). A typical setting is 86°F (30°C).

Question #4: **Ambient AIR DUCT low:** 32°F (0°C)  
↕  
210°F (99°C)

Use the number keys to enter in the low temperature threshold for this probe. The acceptable range is 32°F to 210°F (0°C to 99°C). A typical value is 59°F (15°C).

Question #5: **Ambient AIR DUCT:** 2°F (1°C)  
↕  
178°F (99°C)

Use the number keys to enter in the rate-of-temperature change threshold for this probe. The rate-of-temperature change is in degrees per hour. The acceptable range is 2°F to 178°F (1°C to 99°C). A typical value is 5°F/hr (3°C/hr).

Question #6: **Ambient AIR DUCT high:** 1% RH  
↕  
99% RH

Use the number keys to enter in the high humidity threshold for this probe. The acceptable range is 1% to 99% Relative Humidity. A typical value is 60% Relative Humidity.

Question #7: **Ambient AIR DUCT low:** 0% RH  
↕  
98% RH

Use the number keys to enter in the low humidity threshold for this probe. The range is 0% to 98% Relative Humidity. A typical value is 40% RH.

Question #8: **Ambient AIR DUCT:** 0%RH/hr  
↕  
99%RH/hr

Use the number keys to enter in the percent of change in relative humidity threshold. The range is 0% to 99%. A typical value would be 5% change per hour.

### Radio Field Strength probes

The RFI probe used with the PowerScope measures full strength radio frequency interference and radio frequency surges.

If you have an RFI probe plugged into one or more of the environmental channels, you will be asked to choose thresholds for these measurements in the Setup Menu.

Question #1: **Sensor setup:**

A  
B  
C  
D  
↑  
↓  
H

Use the value up/value down keys to select which probe you will set thresholds for now. For the sake of example, let's say you have a radio field strength probe plugged into Channel C and will set its thresholds now.

Question #2: **Name: FIELD C**

Use the number/letter keypad to enter up to 9 characters to name this probe. Let's say you name it STUDIO.

Question #3: **Field STUDIO range: 3V/M**

10 V/M  
30 V/M  
100 V/M  
300 V/M

Use the value up/value down keys to select the radio field strength range for this probe.

Question #4: **Field STUDIO surge:**

Use the number keys to select a radio field strength surge threshold for this probe. Your choices are affected by whatever radio field range you chose in the last question as follows:

Full Scale	Default Setting	Acceptable Range
3 V/M	1.5 V/M	0.1 - 3.0 V/M
10 V/M	5.0 V/M	1.0 - 10.0 V/M
30 V/M	15 V/M	1.0 - 30.0 V/M
100 V/M	50 V/M	1.0 - 100 V/M
300 V/M	150 V/M	1.0 - 300 V/M

### AC/DC/Impulse probes

The AC/DC/Impulse probe used with the PowerScope measures either AC lines where it makes true RMS measurements, or DC power where it monitors batteries and DC supplies.

If you have an AC/DC/Impulse probe plugged into one or more of the environmental channels, you will be asked to choose thresholds for its measurements.

Question #1: **Sensor setup:**

A  
B  
C  
D  
↕  
H

Use the value up/value down keys to select which probe you will be setting thresholds for now. (Your choices will depend on which environmental channels are being used.) For the sake of example, let's say you have an AC/DC/Impulse probe plugged into channel D.

Question #2: **Name: VOLTAGE B**

Enter up to 9 characters from the keypad to name this probe. Let's say you name it ROOM 6.

Question #3: **Sensor Mode:**    **Rms**  
  Vdc

Use the value up/value down keys to choose whether you will use this probe to monitor alternating or direct current. Let's say you want to monitor AC (Rms) now. (Vdc is explained afterwards.)

Question #4: **Voltage high:**

1.0 Vrms  
↕  
600.0 Vrms

Use the number keys to enter the high voltage threshold for this probe. The acceptable range is 1.0 to 600.0 Vrms. Usually the threshold should be set to 10% above the nominal voltage. A typical value is 125.0 Vrms.

Question #5: **Voltage low:**

0.0 Vrms  
↕  
599.9 Vrms

Use the number keys to enter the low voltage threshold for this probe. The acceptable range is 0.0 to 599.9 Vrms. Usually the setting should be made to 10% below the nominal voltage. A typical value is 105.0 Vrms.



**Use the number keys to enter the impulse threshold.** The impulse threshold for this probe depends on the high voltage threshold as follows:

High Voltage Threshold		Full Scale Setting	Impulse Threshold
1.0 - 15.0	Vrms	20.0 Vrms	0.0 - 8.0 Vrms
15.1 - 75.0	Vrms	150.0 Vrms	0.0 - 60.0 Vrms
75.1 - 150.0	Vrms	300.0 Vrms	0.0 - 120.0 Vrms
150.1 - 600.0	Vrms	600.0 Vrms	0.0 - 240.0 Vrms

Rms

Question #7: **Mode: Vdc**

**Use the value up/value down keys to select which mode this probe will monitor, Rms or Vdc.** For the sake of example, you choose Vdc.

Question #8: **Voltage high:**

1.0 Vdc



99.9 Vdc

**Use the number keys to enter the high voltage threshold for this probe.** The range is between 1.0 Vdc and 99.9 Vdc. Usually, this threshold should be set to 10% above the nominal voltage. A typical value is 5.5 Vdc.

Question #9: **Voltage low:**

0.0 Vdc



99.8 Vdc

**Use the number keys to enter the low voltage threshold for this probe.** The range is 0.0 Vdc to 99.8 Vdc. Usually this threshold should be set to 10% below the nominal voltage. A typical setting is 4.5 Vdc.

Question #10: **Voltage Room 6 impulse:**

### Question #10: **Voltage Room 6 impulse:**

Use the number keys to enter the impulse threshold for this probe. The full-scale setting and the impulse threshold for this probe depends on the high voltage threshold as follows:

High Voltage Threshold	Full Scale Setting
1.0 Vdc - 6.0 Vdc	10.0 Vdc
6.1 Vdc - 16.0 Vdc	20.0 Vdc
16.1 Vdc - 99.9 Vdc	100.0 Vdc

High Voltage Threshold	Acceptable Impulse Thresholds
1.0 - 6.0 Vdc	10 Vpk - 40 Vpk
6.1 - 15.0 Vdc	10 Vpk - 80 Vpk
15.1 - 99.9 Vdc	10 Vpk - 400 Vpk

### Report Menu Questions for Probes

#### Temperatures probes

Question #1: **AMBIENT B TMP:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the temperature probe plugged into Channel B. (This probe will actually be named whatever designation you entered for it in the Setup Menu.) If you choose the Strip Chart Interval, your PowerScope will just print a strip chart of this signal at the interval you specified in the Question #3 of the Report Menu (see Chapter 2), but will not print any disturbances for this signal (i.e. no surges or sags). If you choose "Text", your PowerScope will print a report of all disturbances for this signal as they occur, but will not print a strip chart for this signal. If you choose "Both", your PowerScope will graph the disturbances of this signal as they occur, and will also print a strip chart of this signal. And if you choose "Off", your PowerScope won't print any disturbance graphs for this signal, and won't print a strip chart. However, the minimum and maximum readings of this signal will be printed in the summary reports.

## Temperature/humidity probes

Question #1: **AMBIENT B Tmp:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the temperature measurement from the temperature/humidity probe plugged into Channel B. The selections are explained above.

Question #2: **AMBIENT B Hmd:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for the humidity measurement from the temperature/humidity probe plugged into Channel B. The selections are explained above.

## Radio Frequency Field Strength probes

Question #1: **FIELD B V/M:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for this probe. The selections are explained above.

## AC/DC/Impulse probes

Question #1: **VOLTAGE B Rms (or Vdc):**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for this probe. The selections are explained above.

Question #2: **VOLTAGE B Imp:**      **Both**  
Strip Chart Interval  
Text  
Off

Use the value up/value down keys to select the kind of reporting you'd like for this probe. The selections are explained above.



## Chapter 9 Testing and Maintaining Your PowerScope

### Using the Self-test key

When you press the SELF TEST key it causes the PowerScope to examine itself and provide a printout verifying the revision level of its software, the boards and probes that are installed, and if there is an internal connection problem with one of the boards. If one of the boards is not properly seated, a "not installed" message will appear on the Status Report.

### Calibrating your PowerScope

When you press the SELF CALIBRATE key on the front panel of the PowerScope, it causes the calibration module to examine the instrument reading compared to a very accurate internal secondary reference voltage source. The PowerScope prints a report of the calibration status and reports when the range, noise, offset, stability or gain for each acquisition board is out of calibration.

**If you get a bad calibration reading:**

- 1) **Open the top cover of the PowerScope by removing the top cover screws.** Make a note of any LEDs on the top of the boards that are not blinking.
- 2) **Unplug the PowerScope.**
- 3) **Slide the printer out and make sure the cable underneath it is properly connected.**
- 4) **Unscrew the board clamp and remove the boards.**
- 5) **Check the cables underneath the boards to be sure they are making good connections.**
- 6) **Replace the boards, being careful to make good solid connections in their sockets.** If all the LEDs light now, replace the cover, power back up, and press the SELF CALIBRATE key again. If you still get an unsatisfactory report, call us.
- 7) **If the LEDs don't blink (or the calibration report noted a "bad" status), you might try swapping that board with one that is blinking to see if the problem follows the board. Then, call us and speak to a Customer Service Representative.**

### What to do when calibration expires

The calibration report will also advise you one month before the calibration module expires. To satisfy National Bureau of Standards (NBS) recommendations, your calibration module should be replaced every year. Call us and ask about our Calibration Module swap program (P/N S-002). (The PowerScope will continue to operate with an expired calibration module, but will not print the BMI logo on the graphs as proof of calibration.)

You can replace the calibration module yourself so you don't have to lose field time.

### What to do if something's broken

We've built the PowerScope to be very reliable and are proud of our service record. Occasionally, as with everything else, you might have a problem. Call us and ask to speak to a Customer Service Representative who will help you troubleshoot the problem over the phone. If necessary, we can



If you get into a tight spot and want to completely reset the PowerScope, you can do a hard reset:

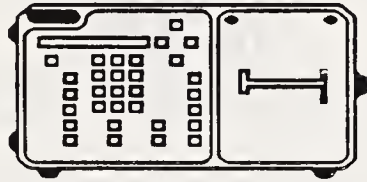
- 1) Go into the Setup Menu and change the site name.
- 2) Insert a shorting clip (e.g. paper clip) into the DC input connector on the back panel, or press the black key next to the LED on the Math board. (The board clamp that holds the PC boards down indicates which is the Math board, etc.)

## Chapter 10 Answers to Common Questions

### How to load paper into your PowerScope

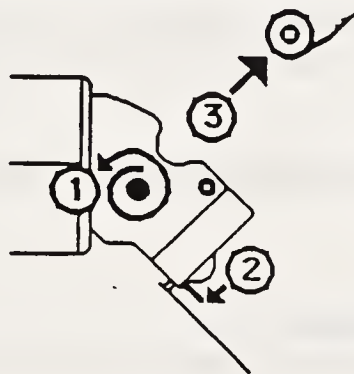
Your PowerScope uses a premium quality grade thermal paper to produce the best possible graphics from its printer. You may obtain replacement thermal paper rolls by ordering BMI part number S-001 from either your BMI authorized representative, or from BMI directly.

- 1) Open the printer door on the PowerScope by unscrewing or pushing down the door releases.

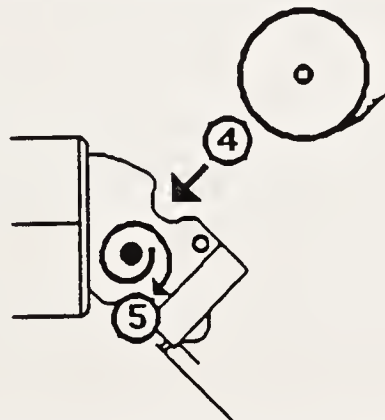


- 2) Slide the printer out by pulling the printer door towards you. The printer will then pivot downwards to give you better access.

- 3) Unscrew the paper roller located on the left side of the printer assembly (1), press down on the paper tension release (2), and remove the old roll of thermal paper (3).



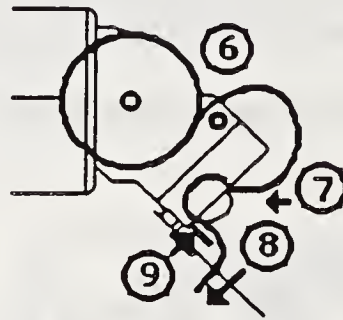
- 4) Place the new roll of thermal paper (4) in the printer and replace the paper roller (5).



- 6) Route the thermal paper over the printer roller (6), and through the paper feed slot in the printer (7).

- 7) Feed the paper through the paper slot in the printer door (8) so that approximately four inches of paper protrudes, and press up on the paper tension release (9).

8) Close the printer door, and press the PAPER FEED key.



### **Too much paper, too many reports...**

Sometimes it seems that your PowerScope is giving you too many reports. You have several choices. You can:

- **Adjust the thresholds in your Set-up menu.** If your thresholds are too tight, you may be getting reports about disturbances that aren't likely to affect the operation of your microprocessor devices. **Or...**
- **Press the Cancel Printer key.** This key cancels the report that is printing right now. It doesn't turn off the printer; it just gets rid of one report. **Or...**
- **Use the Report Menu key to turn off some reports.** The report menu lets you choose which disturbances will be reported, and the detail in which they'll be reported. You can turn off any reports that don't matter to you.
- **Press the CANCEL PRINTER key, then the up arrow to reset the PowerScope and cancel all pending reports.**

### **How many reports per roll of paper**

On average, one roll of thermal paper will supply you with 600 graphs.

## Appendix A Some useful hints...

If you get really confused, you can completely reset the PowerScope. Press the **Cancel printer** key, then immediately press the **up arrow** key.

If the light next to the **Lock** key is on, the keyboard won't work. See the section on Unlocking the PowerScope.

A flashing light next to a key means that you're allowed to use that key.

There are three different menus of questions: the Set-up menu, the Report menu, and the Key Operator menu.

The Set-up menu controls the thresholds of the PowerScope. This is the menu you'll use in the field. You can enter the Set-up menu by pressing the **Set-up menu** key.

You'll use the Report menu to control the level of detail in the PowerScope reports. You can look at the Report menu by pressing the **Report menu** key. (You don't need to use the Report menu if you don't want to; your PowerScope will select reasonable answers for you.)

The Key Operator menu controls the internal settings of the PowerScope, including the clock and the calendar. If you need to use the Key Operator menu, press the **Set-up menu** key, then immediately press the **up arrow** key.

A high-pitched beep, or "click", means that your input has been accepted. A low-pitched beep means that you can't use that key. Three rapid beeps is a warning tone - the PowerScope may be low on paper, for example.





## Appendix B Setup Menu Questions

### Setup Menu for Single Phase Power

- (1) Site:
  - (2) Type: (Power type) Single phase
  - (3) Nominal frequency
  - (4) Frequency tolerance
  - (5) Surge voltage
  - (6) Sag voltage
  - (7) Impulse threshold
  - (8) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (9) Neutral-to-Ground voltage
  - (10) Neutral-to-Ground impulse threshold (occurs only if Impulse Ranging is set to MANUAL)
  - (11) Neutral-to-Ground impulse range
  - (12) High frequency noise
- ...There are additional questions if probes are being used ...

### Setup Menu for Dual 1-Phase Power

- (1) Site:
  - (2) Type: (Power type) Dual 1-phase
  - (3) Phase setup: A
  - (4) Nominal frequency
  - (5) Frequency tolerance
  - (6) Surge voltage
  - (7) Sag voltage
  - (8) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (9) Impulse threshold
  - (10) Neutral-to-Ground voltage
  - (11) Neutral-to-Ground impulse threshold
  - (12) Neutral-to-Ground impulse ranging (occurs only if Impulse Ranging is set to MANUAL)
  - (13) Phase setup: B
  - (14) Nominal frequency
  - (15) Frequency tolerance
  - (16) Surge voltage
  - (17) Sag voltage
  - (18) Impulse threshold
  - (19) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (20) Neutral-to-Ground voltage
  - (21) Neutral-to-Ground impulse threshold
  - (22) Neutral-to-Ground impulse ranging (occurs only if Impulse Ranging is set to MANUAL)
  - (23) High frequency noise
- ...There are additional questions if probes are being used ...



### Setup Menu for 3-Phase Delta Power

- (1) Site
  - (2) Type: (Power type) 3-phase delta
  - (3) Nominal frequency
  - (4) Frequency tolerance
  - (5) Surge voltage
  - (6) Sag voltage
  - (7) Impulse threshold
  - (8) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (9) High frequency noise
- ...There are additional questions if probes are being used ...

### Setup Menu for 3-Phase Wye Power

- (1) Site:
  - (2) Type: (Power type) 3-phase wye
  - (3) Nominal frequency
  - (4) Frequency tolerance
  - (5) Surge voltage
  - (6) Sag voltage
  - (7) Impulse threshold
  - (8) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (9) Neutral-to-Ground voltage
  - (10) Neutral-to-Ground impulse threshold
  - (11) Neutral-to-Ground impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (12) High frequency noise
- ...There are additional questions if probes are being used ...





## Setup Menu for Independent Channels

- (1) Site:
  - (2) Type: (Power type) Independent channels
  - (3) Channel setup: 1
  - (4) Mode: AC
  - (5) Name: Channel 1
  - (6) Nominal frequency
  - (7) Frequency tolerance
  - (8) Surge voltage
  - (9) Sag voltage
  - (10) Impulse threshold
  - (11) Impulse ranging (occurs only if Impulse Ranging is set to MANUAL)
  - (12) High frequency noise
  - (13) Channel setup: 2
  - (14) Mode: DC
  - (15) Name: Channel 2
  - (16) Surge voltage
  - (17) Sag voltage
  - (18) Impulse threshold
  - (19) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (20) High frequency noise
  - (21) Channel setup: 3
  - (22) Mode: NEUT-GND
  - (23) Name: Channel 3
  - (24) Surge voltage
  - (25) Impulse threshold
  - (26) Impulse range (occurs only if Impulse Ranging is set to MANUAL)
  - (27) High frequency noise
  - (28) Channel setup: 4
  - (29) Mode: OFF
- ...There are additional questions if probes are being used ...

## Setup Question(s) If a Temperature Probe is Connected (to Environmental Channel B)

- (1) Sensor setup: B
- (2) Name:
- (3) Ambient high
- (4) Ambient low
- (5) Ambient (rate of change)

## Setup Question(s) If a Radio Frequency Field Strength Probe is Connected (to Environmental Channel B)

- (1) Sensor setup: B
- (2) Name:
- (3) Field B range
- (4) Field B surge



**Setup Question(s) If a Temperature/Humidity Probe  
is Connected (to Environmental Channel B)**

- (1) Sensor setup
- (2) Name
- (3) Ambient B high
- (4) Ambient B low
- (5) Ambient B (rate of temp change)
- (6) Ambient B high (relative humidity)
- (7) Ambient B low (relative humidity)
- (8) Ambient B (rate of humidity change)

**Setup Question(s) If an AC/DC/Impulse Probe  
is Connected (to Environmental Channel B)**

- (1) Sensor setup
- (2) Name
- (3) Sensor mode
- (4) Voltage high
- (5) Voltage low
- (6) Voltage B impulse





## Appendix C Report Menu Questions

### Report Menu Questions When Setup is for Single-Phase Monitoring

- (1) Threshold report
- (2) Initial waves
- (3) Strip charts
- (4) Line-to-Neutral Rms
- (5) Line-to-Neutral high frequency noise
- (6) Line-to-Neutral frequency
- (7) Line-to-Neutral Wave
- (8) Line-to-Neutral Impulse
- (9) Neutral-to-Ground Rms
- (10) Neutral-to-Ground high frequency noise
- (11) Neutral-to-Ground Impulse

...There are additional questions if probes are being used ...

### Report Menu Questions When Setup is for Dual 1-Phase Monitoring

- (1) Threshold report
- (2) Initial waves
- (3) Strip charts:
- (4) Line-to-Neutral A Rms
- (5) Line-to-Neutral A high frequency noise
- (6) Line-to-Neutral A frequency
- (7) Line-to-Neutral A wave
- (8) Line-to-Neutral A impulse
- (9) Neutral-to-Ground A Rms
- (10) Neutral-to-Ground A high frequency noise
- (11) Neutral-to-Ground A Impulse
- (12) Line-to-Neutral B Rms
- (13) Line-to-Neutral B high frequency noise
- (14) Line-to-Neutral B frequency
- (15) Line-to-Neutral B wave
- (16) Line-to-Neutral B impulse
- (17) Neutral-to-Ground B Rms
- (18) Neutral-to-Ground B high frequency noise
- (19) Neutral-to-Ground B impulse

...There are additional questions if probes are being used ...



### **Report Menu Questions When Setup is for 3-Phase Delta Monitoring**

- (1) Threshold report
- (2) Initial waves
- (3) Strip charts
- (4) Phase A-to-B Rms
- (5) Phase A-to-B high frequency noise
- (6) Phase A-to-B frequency
- (7) Phase A-to-B wave
- (8) Phase A-to-B impulse
- (9) Phase B-to-C Rms
- (10) Phase B-to-C high frequency noise
- (11) Phase B-to-C frequency
- (12) Phase B-to-C wave
- (13) Phase B-to-C impulse
- (14) Phase C-to-A Rms
- (15) Phase C-to-A high frequency noise
- (16) Phase C-to-A frequency
- (17) Phase C-to-A wave
- (18) Phase C-to-A impulse

...There are additional questions if probes are being used ...

### **Report Menu Questions When Setup is for 3-Phase Wye Monitoring**

- (1) Threshold report
- (2) Initial waves
- (3) Strip charts
- (4) Phase A-to-Neutral Rms
- (5) Phase A-to-Neutral high frequency noise
- (6) Phase A-to-Neutral frequency
- (7) Phase A-to-Neutral wave
- (8) Phase A-to-Neutral impulse
- (9) Phase B-to-Neutral Rms
- (10) Phase B-to-Neutral high frequency noise
- (11) Phase B-to-Neutral frequency
- (12) Phase B-to-Neutral wave
- (13) Phase B-to-Neutral impulse
- (14) Phase C-to-Neutral Rms
- (15) Phase C-to-Neutral high frequency noise
- (16) Phase C-to-Neutral frequency
- (17) Phase C-to-Neutral wave
- (18) Phase C-to-Neutral impulse
- (19) Neutral-to-Ground Rms
- (20) Neutral-to-Ground high frequency noise
- (21) Neutral-to-Ground impulse

...There are additional questions if probes are being used ...





**Report Menu Questions When Setup is for Independent Channel Monitoring  
(and channels are assigned as shown under the Setup Menu heading in Appendix B)**

- (1) Threshold report
- (2) Initial waves
- (3) Strip charts
- (4) Channel 1 Rms
- (5) Channel 1 high frequency noise
- (6) Channel 1 frequency
- (7) Channel 1 wave
- (8) Channel 1 impulse
- (9) Channel 2 Vdc
- (10) Channel 2 high frequency noise
- (11) Channel 2 wave
- (12) Channel 2 impulse
- (13) Neutral-to-Ground Rms
- (14) Neutral-to-Ground high frequency noise
- (15) Neutral-to-Ground impulse

...There are additional questions if probes are being used ...

**Report Menu Question(s) If a Temperature Probe  
is Connected (to Environmental Channel B)**

- (1) Ambient B Temp

**Report Menu Question(s) If a Radio Frequency Field Strength Probe  
is Connected (to Environmental Channel B)**

- (1) Field B Volts/Meter

**Report Menu Question(s) If a Temperature/Humidity Probe  
is Connected (to Environmental Channel B)**

- (1) Ambient B Temperature
- (2) Ambient B Humidity

**Report Menu Question(s) If a AC/DC/Impulse Probe  
is Connected (to Environmental Channel B)**

- (1) Voltage B Rms or Vdc
- (2) Voltage B impulse



# Appendix D Key Operator Menu Questions

## Key Operator Menu Questions

- (1) Help (language)
- (2) Wave shape
- (3) Wave tolerance
- (4) Hysteresis
- (5) Impulse ranging
- (6) Line impedance
- (7) Temperature units
- (8) Internal Uninterruptable Power Supply
- (9) Keyboard click
- (10) Current month
- (11) Day of month
- (12) Current year
- (13) Date
- (14) Current hour
- (15) Current minute
- (16) Time
- (17) Memory #1 name
- (18) Memory #1 protect
- (19) Memory #2 name
- (20) Memory #2 protect
- (21) Memory #3 name





## Appendix E Description of Cables

The powerScope's cables are color coded according to U.S. wiring standards:

Hot (line) connectors are red

Neutral connectors are black

Ground connectors are green

and,

the jumpers used to switch the line from one channel to another or short out a channel are blue or yellow.

There are several types of cables available for use with your PowerScope.

- single phase measuring cable with NEMA 5-15 plug (three-prong) and color-coded red, black, and green safety connectors
- color coded cables (red, black, and green) with large E-Z hooks
- color coded cables (red, black, and green) with alligator clips
- blue jumper cable
- blue or yellow jumper cable with green ground plug



## Appendix F Quick Connection Guide

<u>Terminal</u>	<u>Single phase</u>	<u>Dual 1-phase</u>	<u>3-phase delta</u>	<u>3-phase wye</u>	<u>Ind. channels</u>
Channel 1 red:	Line	Line A	Phase A	Phase A	User's option
Channel 1 black:	Neutral	Neutral A	Phase B	Neutral	User's option
Channel 1 green:	Earth	Earth	Earth	Earth	Earth
Channel 2 red:	Neutral	Neutral A	Phase B	Phase B	User's option
Channel 2 black:	Ground	Ground A	Phase C	Neutral	User's option
Channel 3 red:	Not used	Line B	Phase C	Phase C	User's option
Channel 3 black:	Not used	Neutral B	Phase A	Neutral	User's option
Channel 4 red:	Not used	Neutral B	Not used	Neutral	User's option
Channel 4 black:	Not used	Ground B	Not used	Ground	User's option

- If you select independent channels, the connections are different .







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